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National Identity and Self-Rated Health Trajectories Among Multicultural Adolescents in Korea: A Piecewise Latent Growth Model

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Purpose: This study examined whether changes in national identity are associated with contemporaneous changes in self-rated health (SRH) among multicultural adolescents in Korea, with particular attention to the transition from elementary to middle school.
Methods: This study utilized five time-point data (2019-2023) from the second panel of the Multicultural Adolescents Panel Study (MAPS) conducted by the National Youth Policy Institute (NYPI). Piecewise latent growth modeling was applied to estimate trajectories before and after the elementary-middle school transition and to test whether piecewise change in national identity predicted piecewise change in SRH, adjusting for gender, body mass index, parental nationality, self-rated economic condition, and stress.
Results: In unconditional models, national identity increased across the elementary-school years and decreased in middle school, whereas SRH declined throughout, with a steeper drop during middle school. In conditional models, national identity showed positive, period-specific associations with SRH: higher initial national identity was linked to higher initial SRH, a greater increase in national identity during elementary school corresponded to a minor decline in SRH during the same period, and less decline in national identity during middle school was associated with a smaller concurrent decline in SRH.
Conclusion: Among multicultural adolescents, national identity and SRH are intimately associated within developmental periods, and both are sensitive to school-level transitions. Continuous, school- and community-based support that fosters stable, positive national identity across the elementary-middle school transition may promote adolescents' health.

Keywords: Adolescent; Cultural diversity; Subjective health; Acculturation; Self concept

Inntroduction

With the expansion of international exchange and population mobility, South Korea has experienced a surge in both the influx of foreign nationals and the number of multicultural households. Since the 2000s, the increasing presence of international students, migrant workers, and marriage migrant women has contributed to a steady growth in the foreign resident population, accompanied by a marked increase in the number of children and adolescents born into multicultural families [1]. According to an educational statistics analysis published by the Ministry of Education in 2025, students from multicultural families accounted for approximately 3.8% of the total student population, totaling 193,814 individuals. Notably, approximately 80% of these children are expected to transition into adolescence in the near future [2].

This demographic shift indicates that Korean society is gradually becoming multicultural, highlighting the need for systematic attention and support for the health issues of the growing population of multicultural children and adolescents. Adolescence refers to a period of rapid physical and psychological changes. Multicultural adolescents not only experience bicultural stress and discrimination due to their multicultural background but are also

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susceptible to certain unique psychological vulnerabilities of adolescence, such as identity confusion and role conflict arising from incompatible home-school expectations [3]. Furthermore, they are not fully accepted as members of society, and thus, experience psychological challenges [4]. Particularly, because Korean society emphasizes ethnic and cultural homogeneity, multicultural adolescents are exposed to prejudice, discrimination, and confusion regarding values and identity, leading to various mental health issues and interpersonal relationships challenges [3,4].

Identity can be broadly categorized into personal identity and social identity—the former addresses the question: "Who am I?"; the latter addresses the question: "Who are we? [5]. These dimensions should develop in a complementary and integrated manner [6]. National identity—a subdimension of social identity—refers to a sense of belonging to one's nation and ethnic community, encompassing the recognition and acceptance of its language, culture, and values, while fostering pride and positive attitudes [6,7]. The social identity theory emphasizes that group membership is intimately associated with self-esteem and psychological stability, which is particularly relevant in Korea, where cultural and ethnic homogeneity is emphasized [6,8]. Multicultural adolescents with a well-established national identity are more likely to internalize positive values rather than experience bicultural identity confusion [9]. Thus, national identity extends beyond social belonging, serving as a key foundation for adolescents' global health appraisals as captured by self-rated health (SRH) [10].

SRH is a global self-appraisal that integrates physical, psychological, and social aspects of well-being and reliably predicts subsequent outcomes [3,11]. Meta-analyses and cohort studies show that a SRH item independently predicts mortality and is associated with healthcare utilization [12-14]. Beyond prediction, SRH shows consistent associations with objective indicators—including clinician ratings, functional status and biomarker measures—supporting its use as a concise global indicator [15,16]. In adolescents, SRH shows similar patterns : it correlates with psychosocial functioning and health behaviors and prospectively predicts later health and health-care use, indicating continuity of these associations across the life course [17-19]. Although determinants of SRH vary across the life course [20]; the evidence base remains concentrated on adults and older adults, with relatively few adolescent studies [21]. Although adolescence is generally a period of relatively good physical health, environmental factors such as socioeconomic status, residential area, ethnicity, and interpersonal relationships, as well as psychological factors including stress and depression, have been reported to be significantly associated with SRH [3,11,20-22]. Moreover, SRH in adolescence is closely linked to self-concept formation and serves as a crucial predictor of health-related identity and health behaviors in adulthood [9]. However, most adolescent SRH studies have been cross-sectional and focused on general youth populations [3,21,22], with limited attention to the unique experiences and vulnerabilities of multicultural adolescents.

Guided by the social identity approach to health, national identity may shape adolescents' SRH through multiple pathways [10]. Stronger identification with a valued national in-group can enhance belonging and perceived social support, promote the internalization of health-relevant norms and collective efficacy that foster adaptive health practices, and buffer the psychological and physiological impact of discrimination [10,23,24]. These processes affect mood, sleep, energy, and daily functioning—core components of adolescents' global health appraisals captured by SRH [25]. In contexts where cultural homogeneity is salient, such identity-linked processes may be especially consequential for multicultural adolescents. Accordingly, within-person increases in national identity are expected to be associated with concurrent improvements in SRH, with effects potentially amplified during the middle-school transition, when identity consolidation and peer comparison intensify.

Ethnicity and cultural background influence not only biological factors but also psychological stability and coping strategies for stress, which in turn shape individuals' health perceptions and behaviors [26]. National identity is formed based on a sense of social integration and security within one's nation, and this identity is reflected in attitudes and perceptions about health [3,6]. As SRH is a self-assessment of one's overall health, psychological stability and the establishment of identity are key determinants [11]. Research indicates that the health status of multicultural adolescents is intimately associated with cultural factors [3,26]. However, as adolescent identity is formed through continuous interaction with various environmental factors [9], there exists a need for research that examines these relationships longitudinally. Nevertheless, very few studies have analyzed the influence of national identity on SRH over time. Therefore, this study aimed to identify developmental inflection points at which national identity and SRH co-vary, thereby generating actionable evidence for school and community health nurses to design culturally responsive, identity-supportive interventions during the middle-school transition [6,27]. To this end, a piecewise latent growth model was applied to capture developmental variations across these school stages.

Methods

Study design

This study is a secondary analysis utilizing raw data from the Multicultural Adolescents Panel Study (MAPS) conducted by the National Youth Policy Institute (NYPI) in South Korea. The analysis attempted to ascertain whether changes in national identity have differential effects on changes in SRH between elementary and middle school years. To capture these developmental stage-specific differences, a piecewise latent growth model was applied to five waves of longitudinal data collected from participants during elementary school (2019) to middle school (2023). The study was designed and reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [28].

Data source and study population

The second panel of the MAPS comprised multicultural adolescents who were fourth graders in elementary school when the second panel was established, and data were collected annually from 2019 to 2023 [29]. In 2019, a nationally representative sample of 2,249 households—including fourth-grade multicultural adolescents and their parents—was selected using stratified random sampling and probability proportional to size sampling methods. All waves used interviewer-administered, tablet-assisted personal interviewing conducted by trained professional interviewers under standardized field protocols [30]. The survey followed participants annually and included adolescents and their mothers residing in all 17 metropolitan and provincial regions of South Korea, ensuring national representativeness [31].

In MAPS, "multicultural adolescents" are defined as children from families with international marriages, immigrant adolescents, and those with foreign-born parents. We included all adolescents who met the MAPS second-panel definition of "multicultural adolescents" and who had valid measures of national identity and SRH in at least one wave (2019-2023). For this study, a total of 2,271 adolescents were included in the analysis: 1,156 boys (50.9%) and 1,115 girls (49.1%).

Simulation benchmarks indicate that latent growth models generally achieve adequate power with samples of approximately 200-300 [32]. For piecewise models with a midpoint knot, detecting a small slope difference ($\Delta\beta = 0.05$) at 80% power typically requires 871-879 samples; our sample ($N = 2,271$) comfortably exceeds these thresholds [33].

Ethics statement

This study utilized data from the MAPS (2nd wave), conducted by the National Youth Policy Institute. The present secondary analysis of anonymized data was reviewed and approved as exempt from full review by the Institutional Review Board of Korea Disease Control and Prevention Agency (approval number: KDCA-2025-09-07).

Study variables

1. Dependent variable

The dependent variable in this study was SRH, assessed based on responses from the first to fifth waves. SRH was measured with two items: "I am physically healthy" and "I am mentally healthy." Each item was rated on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree). For analytic convenience, responses were rescaled to a 0-3 scale and summed, with higher scores indicating a more positive self-evaluation of health.

2. Independent variable

National identity among multicultural adolescents was measured with a four-item scale adapted by the National Youth Policy Institute from Seong's instrument [34]. The items were modified from the group-involvement subscale of a social identification measure to assess affective engagement with Korea (e.g., "When someone praises Korea, I feel as if I am being praised," "I am interested in what people from other countries think about Korea"). Each item was rated on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree). For analytic convenience, responses were rescaled to 0-3 and summed; higher scores indicate a greater sense of belonging and attachment to Korea. Internal consistency (Cronbach's α) across waves was .82 (Wave 1), .84 (Wave 2), .84 (Wave 3), .87 (Wave 4), and .88 (Wave 5).

3. Control variables

Based on previous studies [3,9], the following covariates were included: gender, body mass index (BMI), parental nationality, self-rated economic condition, and stress. Gender was dummy-coded (female = 1, male = 0). BMI was calculated as weight (kg) divided by height (m) squared, using height reported in centimeters converted to meters, and treated as a continuous variable. Parental nationality was included as a covariate to account for background heterogeneity and was dummy-coded (0 = one foreign-born parent, 1 = both parents foreign-born). Self-rated economic condition was assessed with the item, "How would you describe your household's economic status?" on a

5-point scale (1 = very poor to 5 = very well-off); responses were rescaled to 0-4 and used as a continuous variable treated as approximately continuous for analysis, consistent with guidance for ≥ 5-category Likert variables [35]. Stress was measured with two items: "I feel stressed in daily life" and "For at least two consecutive weeks, I have felt hopeless to a degree that interfered with daily life" [36], each rated on a 4-point Likert scale (1 = never to 4 = often). For analysis, items were rescaled to 0-3 and summed, with higher scores indicating greater stress during the past year. All control variables were taken from the adolescent questionnaire at Wave 1.

Data analysis

To examine whether the association between changes in national identity and changes in SRH differs by developmental period, we applied a piecewise growth modeling approach. Piecewise growth modeling is an extension of latent growth modeling that estimates distinct growth functions for qualitatively different time segments by introducing a split (knot) in the growth function; it is appropriate when a variable's trajectory is expected to shift at a specific time point [37]. In our piecewise linear specification, coefficients are interpreted as in a standard linear growth model, but level and/or slope are allowed to change at the knot. Residual variances were constrained to be equal across waves (i.e., homoscedastic errors over time) [38]. The knot was set at the transition from elementary to middle school (end of 6th grade), so that rates of change were estimated separately for the periods before and after that transition.

The analytic procedure was as follows. First, we described the sample's sociodemographic characteristics and study variables using descriptive statistics. Second, to identify the best-fitting trajectory for each construct (SRH and national identity), we fitted a series of unconditional growth models—no-growth, linear, quadratic, and piecewise—and compared model fit. Overall fit was evaluated using χ^2, Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC). As χ^2 is sensitive to model complexity and sample size [39], we emphasized indices that balance fit and parsimony (TLI, CFI, RMSEA, SRMR). Following conventional guidelines, we regarded TLI and CFI ≥ .90 and RMSEA and SRMR ≤ .08 as indicating acceptable fit [40]. We utilized AIC and BIC for relative model selection; lower AIC/BIC values indicate better expected fit. Third, we estimated conditional growth models to test whether changes in national identity predict concurrent changes in SRH. Missing data were handled with full-information maximum likelihood under the Missing at Random assumption, which yields minimally biased estimates in large samples [41]. All analyses were conducted in R (version 4.4.2). The final hypothesized model is depicted in Figure 1.

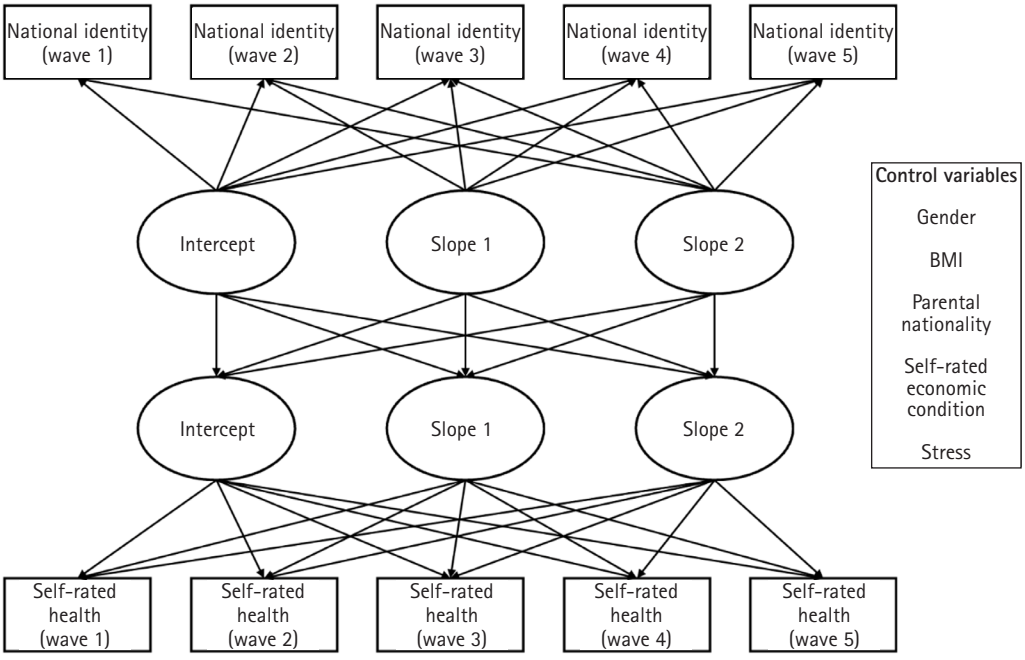


Figure 1. Final conditional model.

Results

Descriptive statistics

Descriptive statistics for participants' sociodemographic characteristics and key variables are summarized in Table 1. The mean level of SRH showed an overall declining trend—decreasing modestly during the elementary-school years and more sharply during middle school. Mean national identity increased across the elementary-school years and then decreased in middle school. The sample comprised 50.9% male adolescents (n = 1,156) and 49.1% female adolescents (n = 1,115). Adolescents with both parents of foreign nationality accounted for 15.9% (n = 361), whereas those with only one foreign-born parent accounted for 84.1% (n = 1,910). The mean BMI was 19.40 (standard deviation [SD] = 3.71) kg/m^2; the mean score for self-rated economic condition was 2.39 (SD = 0.85), and the mean stress score was 1.53 (SD = 1.47).

Table 1. Descriptive Statistics (*N*=2,271)

Variable	Measure	n(%) or M ± SD
Self-rated health	wave 1 (4th grade in elementary school)	4.98 ± 1.10
	wave 2 (5th grade in elementary school)	4.96 ± 1.07
	wave 3 (6th grade in elementary school)	4.91 ± 1.12
	wave 4 (7th grade/1st year of middle school)	4.80 ± 1.12
	wave 5 (8th grade/2nd year of middle school)	4.74 ± 1.12
National identity	wave 1 (4th grade in elementary school)	6.49 ± 2.87
	wave 2 (5th grade in elementary school)	6.72 ± 2.82
	wave 3 (6th grade in elementary school)	7.16 ± 2.68
	wave 4 (7th grade/1st year of middle school)	6.93 ± 2.68
	wave 5 (8th grade/2nd year of middle school)	6.89 ± 2.72
Gender	Male	1,156 (50.9)
	Female	1,115 (49.1)
BMI	(kg/m^2)	19.40 ± 3.71
Parental nationality	One foreign-born parent	1,910 (84.1)
	Both parents foreign-born	361 (15.9)
Self-rated economic condition		2.39 ± 0.85
Stress		1.53 ± 1.47

BMI, body mass index; M ± SD, means±standard deviations.

Evaluation of the unconditional growth models for selfrated health and national identity

To estimate the trajectories of SRH and national identity among multicultural adolescents, we compared the model fit indices of four latent growth models prior to including explanatory variables: the no-growth model, linear growth model, quadratic growth model, and piecewise growth model (Table 2).

The trajectory of SRH showed acceptable fit across all models except the no-growth model, with the piecewise growth model demonstrating the highest TLI and CFI and the lowest RMSEA, AIC, and BIC values. Similarly, for national identity, all models except the no-growth and linear models demonstrated acceptable fit, and the piecewise growth model again achieved superior fit, with higher TLI and CFI and lower RMSEA, SRMR, AIC, and BIC values. Ultimately, the piecewise growth model was selected because it allows for distinct modeling of elementary and middle school periods, supports greater hypothesis testing across variables, and offers a balance of interpretability and fit.

The results of the unconditional growth model for SRH and national identity, based on the piecewise growth model, are presented in Table 3. The mean SRH score of multicultural adoles-

Table 2. Model Fit Indices for Latent Growth Models of Self-rated Health and National Identity (*N*=2,271)

Variable	Model type	χ^2 (df)	*p*	TLI	CFI	RMSEA	SRMR	AIC	BIC
Self-rated health	No growth	374.60 (17)	< .001	0.88	0.80	0.10	0.08	29178.45	29195.63
	Linear	76.89 (14)	< .001	0.98	0.97	0.04	0.05	28886.74	28921.1
	Quadratic	26.99 (10)	.003	0.99	0.99	0.03	0.02	28844.83	28902.11
	Piece-wise	26.32 (10)	.003	0.99	0.99	0.03	0.02	28844.16	28901.44
National identity	No growth	474.42 (17)	< .001	0.86	0.76	0.11	0.09	47609.54	47626.72
	Linear	225.72 (14)	< .001	0.92	0.89	0.08	0.06	47368.84	47403.21
	Quadratic	108.55 (10)	< .001	0.95	0.95	0.07	0.04	47259.67	47316.95
	Piece-wise	105.78 (10)	< .001	0.95	0.95	0.07	0.04	47256.90	47314.18

AIC, Akaike information criterion; BIC, Bayesian information criterion; CFI, Comparative Fit Index; RMSEA, Root Mean Square Error of Approximation; SRMR, Standardized Root Mean Square Residual; TLI, Tucker-Lewis Index.

cents in the first wave (4th grade of elementary school) was 4.99. Both the elementary-school slope (S1) and middle-school slope (S2) were significantly negative, indicating that SRH decreased from elementary school and declined more sharply during middle school. The variances of the intercept, S1, and S2 were all statistically significant, confirming substantial individual differences in SRH levels and rates of change. Additionally, the covariances between intercept and the slopes (S1, S2) were significantly negative, suggesting that adolescents with higher initial SRH experienced a steeper decline over time. This pattern is common in longitudinal studies, as a higher initial score often reflects greater potential for decline [11]. The estimated trajectories of SRH and national identity over time, based on the piecewise growth model, are illustrated in Figure 2.

The analysis of the trajectory of national identity showed that the mean score in the first wave (4th grade of elementary school) was 6.46, with an increasing pattern observed during elementary school followed by a decline in middle school. The variances of the intercept, as well as the slopes for the elementary- and middle-school periods (S1 and S2), were all statistically significant, indicating substantial individual differences. Additionally, the covariances between the intercept and the slopes were significantly negative, suggesting that adolescents with higher initial national identity scores experienced smaller increases during elementary school and a steeper decline during middle school.

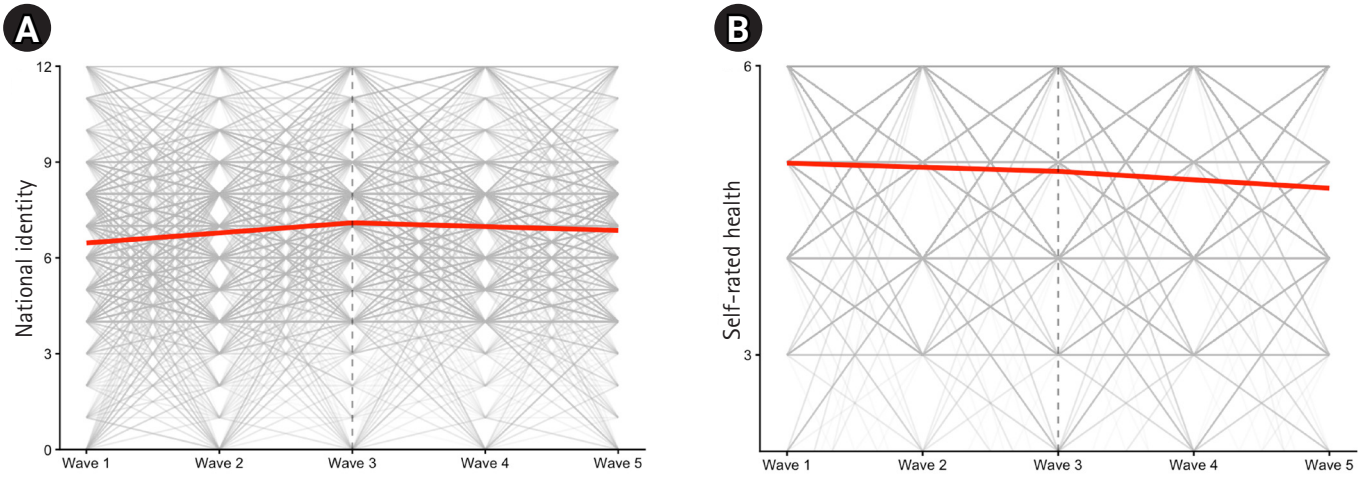
Assessing the influence of independent variables via conditional growth modeling

Table 4 summarizes the conditional growth model, showing the effects of national identity's piecewise trajectories on the piecewise growth of SRH. The trajectory of national identity showed that the mean score at the first wave (4th grade of elementary school) was 6.46, with an increasing trend observed during the elementary-school years and a subsequent decline during the middle-school years. The variances of the intercept and the slopes for the elementary- and middle-school periods (S1 and S2) were all statistically significant, indicating individual heterogeneity in developmental patterns. Furthermore, the covariances between the intercept and the slopes were significantly negative, suggesting that adolescents with higher initial national identity scores exhibited smaller increases during elementary school and steeper declines during middle school.

Table 3. Means and Variances of the Intercepts and Slopes in the Unconditional Growth Models (N=2,271)

Variables	Intercept (I)		Slope 1 (S1)		Slope 2 (S2)		Covariance		
	Mean	Variance (p)	Mean	Variance (p)	Mean	Variance (p)	I and S1 (p)	I and S2 (p)	S1 and S2 (p)
Self-rated health	4.99 (< .001)	0.53 (< .001)	-0.04 (.002)	0.11 (< .001)	-0.09 (< .001)	0.08 (< .001)	-0.09 (< .001)	-0.07 (< .001)	0.00 (.763)
National Identity	6.46 (< .001)	4.15 (< .001)	0.31 (< .001)	0.85 (< .001)	-0.12 (< .001)	0.28 (.001)	-0.98 (< .001)	-0.41 (< .001)	0.07 (.264)

Slope 1 reflects the rate of change during elementary school years, while Slope 2 reflects the rate of change during middle school years.



The solid red line indicates the estimated mean trajectory; thin gray lines show individual trajectories; the vertical dashed line marks the transition from elementary to middle school.

Figure 2. Trajectories of (A) national identity and (B) self-rated health among multicultural adolescents estimated using a piecewise growth model.

Table 4. Effects of Piecewise Trajectories of National Identity on the Piecewise Growth of Self-Rated Health (*N*=2,271)

Variables	Categories	Self-rated health					
		Intercept		Slope 1		Slope 2	
		B(SE)	*p*	B(SE)	*p*	B(SE)	*p*
National identity	Intercept	0.11(0.02)	< .001	-0.01(0.01)	.588	0.04(0.02)	.072
	Slope 1	0.07(0.04)	.125	0.09(0.04)	.019	-0.03(0.05)	.583
	Slope 2	-0.04(0.14)	.790	-0.19(0.12)	.100	0.50(0.18)	.007
Gender	(ref. male)	0.10(0.04)	.019	-0.05(0.03)	.076	-0.06(0.03)	.042
BMI	(kg/m^2)	-0.01(0.01)	.275	-0.01(0.00)	.587	0.01(0.00)	.694
Parental nationality (ref. one foreign-born parent)		0.17(0.06)	.003	-0.08(0.04)	.055	0.03(0.04)	.485
Self-rated economic condition		0.24(0.02)	< .001	-0.07(0.02)	< .001	0.01(0.02)	.860
Stress		-0.13(0.01)	< .001	0.02(0.01)	.055	0.00(0.01)	.575

Intercept denotes predicted Wave 1 (4th grade in elementary school). Slope 1 reflects the rate of change during elementary school years, while Slope 2 reflects the rate of change during middle school years. BMI, body mass index; SE=Standard error.

Analysis of the control variables showed that female adolescents reported significantly higher SRH at the fourth-grade baseline compared to male adolescents, but exhibited a steeper decline during middle school. Adolescents with both parents of foreign nationality reported significantly higher SRH at the fourth-grade baseline than those with only one foreign-born parent. Higher self-rated economic condition was associated with higher SRH at the baseline, but also with a larger decline in SRH during the elementary school years. Additionally, higher stress levels were significantly associated with lower SRH at the baseline.

Discussion

This study conducted a longitudinal analysis to examine the association between changes in national identity and changes in SRH among multicultural adolescents, and applied piecewise growth modeling to capture differences between the elementary and middle school periods. The relationship between national identity and SRH demonstrated positive associations within each developmental stage, indicating that adolescents with higher national identity scores tended to perceive their health more positively at the corresponding time points. These findings suggest that fostering and maintaining a positive sense of national identity during periods of environmental transitions, such as school-level changes, may serve as a key strategy for promoting the SRH of multicultural adolescents.

The analysis of the trajectories of national identity among multicultural adolescents revealed that national identity increased during elementary school years but transitioned into a declining trend in middle school. A previous study [9] reported that the trajectory of national identity among multicultural adolescents varied with changes in classroom environments, suggesting that classroom transitions constitute a critical period for changes in national identity. The transition from elementary to middle school is a psychological shift from childhood to adolescence, characterized by increasing understanding of abstract concepts and intensified social comparison and internalization of social norms within peer groups [42]. Particularly, early adolescence is a developmental stage during which peer influence on self-concept, identity, and sense of belonging becomes particularly pronounced, and frequent questions such as “Who are you?” or “How did your parents get married?” often provoke identity conflicts, acculturative stress, and confusion in identity development [6,7]. Therefore, the development of consistent multicultural education policies across school transitions is essential. Particularly, because middle school is a crucial period when national identity becomes vulnerable, school- and community-based interventions are required to address identity conflicts among peer groups, alongside educational programs designed to support the formation of a positive national identity among multicultural adolescents.

This study identified a consistent downward trajectory in multicultural adolescents’ SRH, with a more pronounced decline during the middle school years. A few studies [11,43] have reported a rising trajectory of SRH during school age, while others [44] have shown a gradual decline, suggesting inconsistent findings likely attributable to differences in study settings, specific age ranges, and racial or ethnic backgrounds. Notably, participants in this study demonstrated a greater decline in SRH during school transitions, which may be closely linked to developmental characteristics, sociocultural context, and socioeconomic factors. Middle school is a crucial period characterized by intense internal exploration and external comparison of social status, roles, and identity, accompanied by increased sensitivity to peer rela-

tionships and access to social resources [45]. Perceived social status and economic disparities among peers during this period are more strongly associated with physical symptoms and psychological distress in adolescence than objective socioeconomic status [11,43,44]. Given that multicultural families in Korea often experience lower household income, limited parental education, and unstable employment, the intensified social comparison and economic disparities experienced during middle school may have contributed substantially to the decline in SRH. Therefore, addressing health disparities among multicultural adolescents requires a comprehensive approach that extends beyond individual-level health behavior interventions to include family, school, and community-level efforts aimed at mitigating socioeconomic inequalities and fostering positive identity development.

This study revealed a significant positive effect of changes in national identity on changes in SRH. According to the social identity theory, individuals perceive themselves as members of various social groups, such as family, school, and nation, and this social identity influences multiple psychological and behavioral outcomes, including self-esteem and health behaviors [8]. A study of 1,948 Chinese adolescents identified that national identity positively influenced SRH, with self-esteem mediating the relationship between national identity and subjective well-being [8]. Our pattern aligns with the other studies reporting a positive association between national identity and SRH in multicultural adolescents, alongside ecological determinants of SRH that point to school- and community-level levers for intervention [3,46]. These findings suggest that national identity serves as a key factor in intergenerational cultural adaptation and demonstrates both direct and indirect effects on SRH.

In this study, the initial levels and rates of change in national identity were significantly associated only with SRH during the corresponding developmental periods. This indicates that national identity formed in adolescence is closely tied to contemporaneous perceptions of health rather than exerting lasting effects over time. SRH in elementary and middle school years primarily reflects psychosocial factors such as emotional stability, self-esteem, and environmental adaptability rather than physical health problems, and adolescents who positively evaluate their health tend to demonstrate greater emotional well-being, satisfaction in interpersonal relationships, and positive peer interactions [3]. However, adolescents experience notable fluctuations and individual variability in national identity owing to peer relationships, social stigma, and experiences of discrimination during school transitions [9]. Because both identity and health perceptions are sensitive to environmental change, consistent school-based identity supports are warranted. In the United States, the Identity Project—a universal, eight-session classroom curriculum—improved adolescents' identity exploration and resolution, which in turn predicted higher global identity cohesion, better grades and self-esteem, and lower depressive symptoms [47]. Activities include creating a family tree, developing a photo storyboard, and interviewing a same-background adult to scaffold identity exploration. A culturally adapted version delivered in Italian multiethnic classrooms likewise enhanced identity exploration after reframing "race/ethnicity" as "culture/cultural identity" and adding multilingual activities [48]. In Korea, existing school supports primarily focus on language acquisition and school adjustment; brief, classroom-based curricula that explicitly target identity development remain scarce [49]. Building on these trials, a culturally adapted, classroom-based identity module at the middle-school transition in Korea could be both feasible and beneficial, and may help sustain adolescents' SRH while fostering inclusion.

This study holds significance in that it systematically examined the trajectories and associations between national identity and SRH among multicultural adolescents using longitudinal data and a piecewise growth model that reflected developmental transitions between elementary and middle school. From a community and public health nursing perspective, our findings identify national identity as a modifiable psychosocial determinant of adolescents' SRH and pinpoint the elementary-to-middle-school transition as a critical window for nurse-led, culturally responsive prevention. Embedding brief, identity-supportive curricula in the school curriculum and linking families to local community and multicultural support centers are actionable nursing strategies to mitigate the observed decline in SRH and reduce disparities in multicultural communities. However, several limitations should be noted. First, this study was a secondary analysis based on five waves of data from the MAPS. National identity was measured using only four items assessing pride in being a Korean citizen, which may not sufficiently capture the multidimensional nature of national identity. Similarly, SRH was assessed using a single item that evaluated perceived physical and mental health, limiting its ability to fully reflect adolescents' comprehensive health status. Future studies should adopt multidimensional measures to capture long-term developmental trajectories more accurately. In addition, depressive symptoms were not available at the baseline and therefore could not be included as a covariate; thus, residual confounding cannot be ruled out. It would be informative to explicitly test whether depressive symptoms mediate or moderate the association between national identity and SRH, partic-

ularly among multicultural adolescents. Second, the findings relied primarily on self-reported data, which may be subject to social desirability bias. Further research should incorporate diverse data collection methods and sources to enhance validity. Third, this study did not compare developmental trajectories of national identity and SRH across different multicultural family types (e.g., international marriage families, immigrant adolescents, and foreign-national families). Because unbalanced group sizes limited power to detect group-specific slope differences, we retained pooled models while adjusting for parental nationality. Future studies should employ multigroup growth models with larger type-specific samples to provide a more nuanced understanding of identity and health development among multicultural adolescents.

Conclusions

This study analyzed the longitudinal trajectories of national identity and SRH among multicultural adolescents using five waves of panel data from the MAPS and applied a piecewise growth model to capture developmental transitions between elementary and middle school. Findings revealed that national identity increased during the elementary school years but declined after entry into middle school, while SRH exhibited a gradual decline across all time points, with a sharper decrease observed during middle school. The consistent positive association between national identity and SRH within the same developmental period underscores that the formation of national identity during adolescence is closely linked to contemporaneous perceptions of health. These results highlight that multicultural adolescents' national identity and SRH are highly sensitive to environmental and relational changes, particularly during school transitions. Establishing continuous identity support systems during elementary and middle school may serve as a key strategy for adolescent health promotion. Furthermore, school- and community-based initiatives that foster positive peer interactions and cultural integration are essential for promoting long-term health outcomes and advancing social cohesion in increasingly multicultural societies.

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Conflict of interest

The authors declared no conflict of interest.

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Authors' contributions

You-Jung Choi contributed to conceptualization, data curation, formal analysis, methodology, visualization, and writing-original draft, review & editing.

Data availability

The datasets generated and/or analyzed during the current study are available in the Multicultural Adolescents Panel Study (MAPS) repository, managed by the National Youth Policy Institute (NYPI), and can be accessed upon request: https://www.nypi.re.kr/archive/mps.

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