

Social support, bicultural acceptance, perceived health, and life satisfaction among multicultural adolescents in South Korea: a three-wave autoregressive cross-lagged mediation study

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Research Article

Keywords: Multicultural adolescents, Life satisfaction, Social support, Bicultural acceptance, Perceived health, Autoregressive cross-lagged model, Longitudinal study, South Korea

Posted Date: September 1st, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10631622/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

South Korea has diversified rapidly, yet its receptivity to cultural diversity remains comparatively low, and adolescents from immigrant-background families report lower life satisfaction than their peers. Existing work is largely cross-sectional and treats cultural adaptation and health as separate outcomes rather than as linked processes. Integrating the bioecological model, acculturation theory, and self-determination theory, this study tested whether social support contributes to life satisfaction through the sequential mediation of bicultural acceptance and perceived health.

Methods

Public-use data were drawn from the second cohort of the Multicultural Adolescents Panel Study, covering 2019 (Time 1, N = 2,271), 2020 (Time 2), and 2021 (Time 3), when participants advanced from fourth to sixth grade. Three parallel autoregressive cross-lagged structural equation models, one for each support source (peer relationships, teacher support, parental support), were estimated. Time 2 bicultural acceptance and perceived health were specified as longitudinal mediators of the association between Time 1 support and Time 3 life satisfaction, controlling for autoregressive stability and for sex, age, number of close friends, educational aspiration, and worries about school life, academic performance, and educational or career plans. Longitudinal measurement invariance was tested before the structural models were interpreted, and indirect effects were evaluated with bias-corrected bootstrap 95% confidence intervals.

Results

All three forms of support predicted later bicultural acceptance and perceived health, which in turn predicted subsequent life satisfaction. The mediational form was identical across support sources, whereas its magnitude was graded by the closeness of the relationship: the effect of support on bicultural acceptance was largest for parental support and peer relationships and smaller for teacher support. Perceived health carried the most consistent indirect pathway, and bicultural acceptance contributed both directly and indirectly through perceived health. Parental support produced the strongest indirect effects, and worry about school life showed a reliable negative indirect association with later life satisfaction in every model.

Conclusions

Multicultural adolescents' well-being appears to emerge from cumulative relational, cultural, and health-related processes rather than from isolated individual or family factors. Interventions should jointly

strengthen supportive relationships, bicultural competence, and health-promoting environments across school and family contexts.

Background

Over the past three decades, South Korea has been transformed from a country long characterized by ethnic and cultural homogeneity into an increasingly diverse society. Since the 1990s, the arrival of marriage-migrant women, migrant workers, foreign students, resettled North Korean refugees, and permanent residents has steadily expanded the size and heterogeneity of the immigrant-background population. Administrative statistics illustrate the pace of this change among school-age youth: the number of students with immigrant backgrounds rose from 67,806 in 2014 to 193,814 in 2024, and the proportion enrolled in middle and high school grew from 28.3% to 39.0% over the same period [1]. The composition of this population has also shifted. Whereas Korean-born children of international marriage families once constituted the overwhelming majority, the share of children from foreigner families increased from 6.8% in 2014 to 24.2% in 2024, and the numbers of mid-entry immigrant students and children of foreign-national parents grew several-fold. These trends indicate that multicultural adolescents are not a small or static group but a growing and internally diverse segment of the youth population whose development warrants sustained scholarly and policy attention.

Despite this demographic shift, national surveys suggest that Korean society's receptivity to cultural diversity remains comparatively low relative to other advanced economies, and that the gap in multicultural acceptance between adults and adolescents has widened rather than narrowed. Multicultural adolescents therefore develop within a social ecology that combines expanding diversity with persistent prejudice. Prior research indicates that these adolescents are disproportionately exposed to discrimination, language-related communication difficulties, and identity confusion arising from the divergent cultural expectations of foreign-born parents and the receiving society. When such experiences intersect with social stigma, they can heighten acculturative stress and depressive symptoms and complicate school adjustment. Comparative studies have reported that multicultural adolescents evaluate their own lives less favorably than their non-multicultural peers, and that those who experience discrimination report lower subjective happiness and life satisfaction [2]. Understanding which resources buffer these risks, and how those resources operate over time, is thus both a theoretical and a practical priority.

Life satisfaction, defined as an individual's global cognitive appraisal of the quality of their life against self-defined standards, is a central component of subjective well-being [3, 4]. In adolescence, life satisfaction is not merely an outcome but a developmental asset: higher life satisfaction is associated with stronger identity formation, greater psychological stability, better school adjustment, and resilience in the face of stressful events [5]. Because life satisfaction reflects the perceived congruence between expectations and circumstances across multiple domains, including self, family, school, peers, and economic conditions, it is best understood as a multidimensional and context-embedded construct rather than a simple affective state. For multicultural adolescents, life satisfaction is shaped not only by

the normative developmental tasks of early adolescence but also by the additional task of negotiating two cultural worlds. This dual demand can either strain well-being, when the two cultures are experienced as being in conflict, or enrich it, when adolescents come to accept and integrate both cultural frames.

The present study concentrates on three relational contexts that jointly structure the everyday lives of multicultural adolescents: peers, teachers, and parents. These contexts differ in the type of support they provide. Peer relationships supply belonging, reciprocity, and emotional companionship, and they become increasingly influential as children move through late elementary school. Teacher support conveys recognition, guidance, fairness, and institutional trust, and it is uniquely positioned to shape the school climate in which cultural minority students are included or marginalized. Parental support offers encouragement, educational involvement, and emotional security, and it remains a foundation of adjustment even as adolescents' social worlds expand. Although these sources differ in function, each may help adolescents interpret their multicultural background more positively and evaluate their physical and mental health more favorably, thereby contributing to life satisfaction.

We advance a developmental mediation framework in which social support is linked to life satisfaction sequentially through bicultural acceptance and perceived health. Bicultural acceptance refers to the degree to which adolescents positively accept both Korean culture and the culture associated with their family background, without privileging one over the other. Consistent with contemporary acculturation theory, we treat bicultural acceptance not as a deficit or a marker of divided loyalty but as a cultural asset that supports a coherent, integrated identity [6, 7]. Perceived health, in turn, is treated as a proximal mediator. For adolescents, self-rated physical and mental health reflect embodied, emotional, and social facets of adjustment as much as biomedical status, and self-rated health is a well-established predictor of broader well-being [8]. When adolescents feel supported and culturally secure, they are likely to experience themselves as healthier, which can then translate into higher overall life satisfaction.

A key limitation of the existing literature is its reliance on cross-sectional designs. Such designs can establish that support, bicultural acceptance, health perception, and life satisfaction covary, but they cannot disentangle the temporal ordering of these constructs, rule out reverse causation, or capture individual change across development. This is a substantive shortcoming for a mediation hypothesis, because mediation is inherently a claim about a process that unfolds over time [9, 10]. The present study addresses this gap by analyzing three waves of national panel data with autoregressive cross-lagged structural equation modeling. By regressing each construct on its own prior level and on the lagged values of the other constructs, this approach adjusts for temporal stability and prior standing, providing a more stringent and developmentally informative test of the hypothesized pathways than single-occasion mediation models. In doing so, the study aims to clarify how relational resources become embedded in multicultural adolescents' cultural and health self-perceptions and, ultimately, in their evaluations of their lives.

Beyond addressing a design limitation, the present study responds to a substantive gap in the Korean literature. Although a growing number of studies have examined the correlates of multicultural adolescents' life satisfaction, most have treated social support, bicultural acceptance, and health as separate predictors rather than as elements of a single developmental process, and few have modeled bicultural acceptance and perceived health as sequential mediators. The national scope and repeated-measures structure of the Multicultural Adolescents Panel Study (MAPS) make it possible to test such a process while adjusting for demographic heterogeneity and prior standing. Examining three support sources in parallel further permits a comparison of their relative contributions, which is theoretically important because peers, teachers, and parents differ in developmental salience during the late-elementary transition. By specifying and testing an integrated, time-ordered model across a nationally representative sample, the study aims to move the field from documenting associations toward articulating the mechanisms through which relational resources sustain multicultural adolescents' well-being, and to generate evidence that can inform the timing and targeting of intervention.

Theoretical framework and hypotheses

Three complementary theoretical perspectives frame the present study. First, the bioecological model of human development holds that adolescents' adjustment arises from proximal processes, that is, recurrent and reciprocal interactions with people and settings in their immediate environment, operating within nested and interacting systems of family, peers, and school [11, 12]. From this vantage point, multicultural adolescents' well-being cannot be reduced to individual attributes, because their daily experience is co-constituted by relationships with parents, classmates, and teachers and by the broader cultural expectations that surround them. Second, acculturation theory conceptualizes adaptation as the outcome of how individuals negotiate heritage-culture maintenance and receiving-culture participation; an integration orientation, in which both cultures are valued, is generally associated with the most favorable psychological and sociocultural adaptation [7, 13, 14]. Bicultural acceptance is the attitudinal expression of this integration orientation. Third, self-determination theory identifies relatedness, competence, and autonomy as basic psychological needs whose satisfaction fosters well-being [15]. Support from peers, teachers, and parents can satisfy the need for relatedness and bolster competence in navigating school and cultural demands, thereby facilitating bicultural acceptance and positive health self-appraisals. Together, these perspectives motivate a model in which relational resources shape cultural and health-related self-evaluations that, over time, promote life satisfaction.

Life satisfaction in adolescence

Subjective well-being is typically decomposed into an affective component and a cognitive component, the latter of which is captured by life satisfaction [3, 4]. Life satisfaction is comparatively stable and reflective, making it well suited to longitudinal study of developmental processes. In adolescence, it functions as more than a passive index of adjustment: prospective work shows that higher life satisfaction buffers the impact of stressful events on internalizing and externalizing problems, supporting a view of life satisfaction as a psychological resource rather than merely a symptom of good

functioning [5]. Research with Korean adolescents converges in identifying self-esteem, academic achievement, aspiration level, and a supportive family environment as robust correlates of life satisfaction, with problem behaviors exerting smaller negative effects [2]. Two features of adolescent life satisfaction are particularly relevant here. First, it tends to decline across the school years, a pattern reproduced in the present descriptive data. Second, its determinants shift developmentally, with peer and school factors assuming greater weight as children move toward early adolescence. For multicultural adolescents, these general patterns are overlaid by culture-specific processes, making it important to model both normative and acculturative influences within a single framework.

Social support as a developmental resource

The proposition that supportive relationships protect well-being is longstanding. The main-effect and stress-buffering models specify two complementary mechanisms: support can enhance well-being directly by meeting needs for belonging and esteem, and it can buffer the deleterious effects of stress by altering appraisal and coping [16]. For adolescents, the salient sources of support, namely peers, teachers, and parents, differ in developmental timing and function, and modeling them separately, as we do, clarifies their distinct contributions. Peer relationships offer belonging, reciprocity, and opportunities to practice cooperation and perspective-taking; from a social-capital perspective, they constitute a resource for adapting to new settings and acquiring socioemotional competence [17]. Their importance intensifies during the late-elementary transition, when peer acceptance becomes central to self-evaluation. Teacher support communicates care, fairness, and recognition and shapes the classroom climate that determines whether culturally diverse students feel included; it therefore operates as a developmental as well as an academic resource. Parental support, comprising encouragement, involvement, and the communication of educational expectations, continues to predict adolescents' adjustment and life satisfaction, in part by strengthening self-esteem and positive self-appraisal [18]. Crucially for the present model, social support has been linked not only to well-being but also to cultural adaptation: perceived support from peers, teachers, and neighbors predicts stronger bicultural adaptation among children of multicultural families [19, 20]. This dual relevance positions social support as an antecedent of both cultural and health-related self-evaluations.

Social support may be especially consequential for multicultural adolescents because of the distinctive stressors they encounter. Perceived discrimination, language barriers, and the demands of managing two cultural systems constitute chronic strains that can erode well-being, and the stress-buffering model implies that supportive relationships should attenuate the impact of precisely these strains [16]. Support from peers and teachers can counteract experiences of exclusion in the school setting, where much intergroup contact occurs, while parental support can provide a secure base from which adolescents interpret ambiguous or hostile experiences. At the same time, support is not merely reactive: by affirming adolescents' worth and cultural background, it can promote the positive appraisals of self, culture, and health that underlie life satisfaction. This reasoning implies that the benefits of support for multicultural adolescents should be observable not only in direct associations with life satisfaction but also, and

perhaps more strongly, in indirect pathways operating through cultural acceptance and perceived health, a prediction the present design is well positioned to evaluate.

Bicultural acceptance

Biculturalism denotes the capacity to hold, and move between, two cultural frames rather than assimilating to one at the expense of the other [6]. Bicultural acceptance, the attitude of positively receiving both the heritage and mainstream cultures without imposing a hierarchy between them, has been theorized as a linchpin of healthy acculturation. LaFromboise et al. [21] argued that negative or hierarchical attitudes toward either culture generate friction in cross-cultural interaction and can contribute to maladjustment, whereas an integrated, accepting stance supports a coherent self-concept. A meta-analysis of the biculturalism literature found that biculturalism was positively and moderately associated with both psychological and sociocultural adjustment, and that this association was robust across operationalizations [6]. Ethnic-identity research similarly links a secure, affirmed sense of cultural belonging to better well-being among adolescents from immigrant backgrounds [22]. Empirical work with Korean multicultural youth is consistent with these claims: bicultural acceptance has been associated with greater ego-resilience and achievement motivation and with lower depression, anxiety, and social withdrawal, and it appears to mediate the relationship between acculturative stress and psychological maladjustment [23, 24]. Importantly, bicultural acceptance is itself socially embedded, being shaped by peer relationships, teacher and neighbor support, and parents' own acculturation strategies, and it follows a developmental trajectory, typically rising in the elementary years before declining [20, 24]. These findings justify positioning bicultural acceptance as a mediator that is both influenced by social support and predictive of later well-being.

Two additional features of bicultural acceptance warrant attention. First, its development is patterned by both individual and family factors, including the acculturation strategies of foreign-born mothers, and there is evidence of gender differences, with girls sometimes exhibiting higher acceptance than boys and the influence of maternal acculturation differing by adolescent gender [24]. Because such background characteristics may confound the association between support and bicultural acceptance, the present analyses adjusted for sex and other demographic covariates. Second, treating bicultural acceptance as an asset does not deny the reality of acculturative stress; rather, it reframes the question from whether a multicultural background is inherently burdensome to how adolescents can be supported in integrating their two cultural worlds. This asset-based framing is consistent with contemporary acculturation science, which emphasizes that outcomes depend on how the acculturation process is navigated and on the receptivity of the surrounding context [7], and it motivates the study's focus on modifiable relational resources rather than on fixed group membership.

Perceived health

Perceived, or self-rated, health captures an individual's global appraisal of their physical and mental condition and functional capacity. Although often treated as a proxy for physical status, self-rated health is more accurately understood as an integrative judgment that incorporates emotional state, social

functioning, and a general sense of vitality, and it predicts a wide range of well-being and health outcomes independent of objective indicators [8]. In adolescence, perceived health is closely tied to self-concept, and the health attitudes formed during this period tend to persist into adulthood. Mental health, in particular, reflects the capacity to manage daily life autonomously, cope with stress, and function within family and social roles, and thus indexes psychological stability more broadly than the mere absence of symptoms. Among multicultural adolescents, perceived discrimination has been shown to undermine mental health and elevate depressive symptoms, whereas bicultural acceptance supports psychological stability and identity formation [25]. Because supportive relationships can foster security and embodied well-being, and because cultural acceptance can reduce identity-related strain, perceived health is theoretically well placed to serve as the proximal mediator through which more distal relational and cultural resources translate into life satisfaction.

The present study

Although the constituent associations of the proposed model are individually supported, they have rarely been examined together within a single, time-ordered framework, and the sequential role of bicultural acceptance and perceived health as linked mediators of the association between support and life satisfaction has not been rigorously tested. Prior studies have shown that social support predicts life satisfaction, that social support fosters bicultural acceptance, and that bicultural acceptance and perceived health each contribute to well-being; the present study integrates these strands into a serial mediation model and subjects it to a longitudinal test. We estimated three parallel autoregressive cross-lagged models, one for each support source, in order to compare their functioning while holding the mediation structure constant. In each model, the Time 1 support variable predicted Time 2 bicultural acceptance and perceived health, which predicted Time 3 life satisfaction; autoregressive paths accounted for the temporal stability of each construct; and sex, age, number of close friends, educational aspiration, and worries about school life, academic performance, and educational or career plans were included as covariates. The conceptual model is displayed in Fig. 1.

On this basis, we advanced three hypotheses. Hypothesis 1 stated that peer relationships, teacher support, and parental support would each be positively associated with later life satisfaction, through direct or indirect pathways. Hypothesis 2 stated that bicultural acceptance and perceived health would mediate these associations, such that support would predict stronger bicultural acceptance and more positive perceived health, which would in turn predict higher life satisfaction. Hypothesis 3 stated that a serial mediation process would emerge, in which social support would predict bicultural acceptance, which would predict perceived health, which would predict life satisfaction. Because the three support sources differ in developmental salience, we further expected, though did not formally hypothesize, that their relative contributions might diverge, with family-based support exerting stronger indirect effects given its foundational role in early adolescence.

Methods

Data and participants

Data were drawn from the second cohort of MAPS, a nationally organized longitudinal study conducted by the National Youth Policy Institute in South Korea [26]. MAPS was designed to document the growth, development, and adaptation of multicultural adolescents and their families and to provide a representative basis for policy. Sampling proceeded in two stages. In the first stage, schools were drawn through stratified random sampling by region and school characteristics; in the second stage, probability-proportional-to-size sampling was applied so that schools enrolling more students from multicultural families had a higher probability of selection, yielding an approximately self-weighting design. Within selected schools, all eligible students were surveyed. The final target sample comprised 2,100 households of multicultural adolescents and their guardians, with an estimated sampling error of plus or minus 2.1 percentage points at the 95% confidence level. Data were collected using tablet-assisted personal interviewing, and translated instruments were provided for foreign-born adolescents and mothers when needed, reducing language-related measurement error.

The present study used the first three annual waves of the second MAPS cohort: 2019 (Time 1), 2020 (Time 2), and 2021 (Time 3), spanning the period in which participants advanced from fourth to sixth grade. This developmental window was selected deliberately. Late elementary school is a transition during which the locus of social influence broadens from parents toward peers and teachers, while cultural identity and self-evaluated health become increasingly salient, precisely the constructs at the center of the proposed model. Concentrating on this window therefore maximizes the theoretical informativeness of the cross-lagged pathways.

The baseline analytic file included 2,271 fourth-grade multicultural adolescents; the fifth- and sixth-grade waves each included 2,273 adolescents, indicating high panel retention across the study period. At Time 1, 1,156 participants were boys (50.9%) and 1,115 were girls (49.1%), and the overwhelming majority were 10 years old (93.7%). International marriage families constituted the largest family type (76.4%), followed by foreigner families (15.9%) and mid-entry immigrant families (7.7%). Most participants resided in small or medium-sized cities (51.6%) or large cities (33.7%), with a minority in towns or rural areas (14.7%). Reflecting the structure of Korean multicultural families, mothers were most often foreign-born (81.5%) and most commonly from Vietnam (33.6%) or China (Han and Korean-Chinese combined, 32.8%), whereas fathers were predominantly Korean-born (73.1%). A majority of students appraised their family's economic situation as average (61.2%), although a non-trivial minority reported economic hardship. Full participant characteristics for all three waves, including parental education, parental country of origin, household composition, and subjective economic status, are reported in Table 1.

Measures

All constructs were measured with items from the MAPS second-cohort questionnaire. Scale ranges and sample items are summarized in Table 2, and the complete set of translated items is provided in Additional file 1. For every construct, items were averaged so that higher scores indicated higher levels,

and identical items were administered at each wave to permit tests of longitudinal measurement invariance.

Life satisfaction was measured with three items assessing enjoyment of life, low worry, and perceived happiness (for example, "I enjoy my life"), rated from 1 (strongly disagree) to 4 (strongly agree). Bicultural acceptance was measured with 10 items adapted from No and Hong [27] that assess attitudes toward Korean and heritage cultures, including cultural enjoyment, ethnic and national pride, intended future residence, educational and occupational aspirations in each country, and the perceived importance of learning both cultures, each rated on a 4-point scale. Perceived health was measured with two items assessing self-rated physical and mental health on a 4-point scale. Peer relationships (three items) [28] assessed friends' interest in, enjoyment of, and understanding of the adolescent; teacher support (three items) assessed the homeroom teacher's interest, concern, and recognition; and parental support (six items) [18] assessed encouragement, help with school difficulties, educational encouragement, interest, guidance, and provision of needed resources. These three constructs were each rated on a 5-point scale ranging from 1 (not at all true) to 5 (very true).

Covariates comprised sex, age, number of close friends, educational aspiration, and current worries about school life, academic performance, and educational or career plans. These variables were included because adolescents' social resources, academic concerns, and future expectations may plausibly influence both perceived support and life satisfaction, and their inclusion guards against spurious attribution of effects to the focal predictors and mediators.

Analytic strategy

Analyses were conducted with SPSS 29.0, Amos 29.0, and Mplus 8.10. As a preliminary step, we examined descriptive statistics and the skewness and kurtosis of all measured variables to verify that the assumptions of maximum likelihood estimation were tenable, computed Cronbach's alpha to assess internal consistency, and inspected the Pearson correlation matrix for the expected pattern of associations and for evidence of multicollinearity. Consistent with best practice for structural equation modeling, we evaluated the measurement model before interpreting structural paths; standardized factor loadings were generally acceptable, ranging from approximately .59 to .88 across measurement components, supporting the adequacy of the latent constructs.

Because the constructs were measured repeatedly, we tested longitudinal measurement invariance before estimating structural relations, comparing a sequence of increasingly constrained models: a configural model, a metric (measurement-weight) invariance model, a path-coefficient (structural) invariance model, and an error-covariance invariance model [9]. Model comparison relied on the change in the comparative fit index (CFI) rather than on the chi-square difference test alone, because the chi-square statistic is overly sensitive to sample size in large samples such as this one; a decrease in CFI of less than .01 was taken as evidence that the more constrained model was tenable [29]. Overall model fit was evaluated using the CFI, the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA), interpreted against conventional cutoffs [30].

The analytic sample was well suited to structural equation modeling. Structural equation models require sufficiently large samples for stable estimation, and samples below roughly 200 cases can yield poor measurement-model fit and unstable parameter estimates; with more than 2,200 participants at each wave, the present study comfortably exceeded conventional thresholds, affording adequate power to detect the small indirect effects characteristic of developmental mediation. High panel retention across the three waves reduced the threat of attrition bias, and any remaining missing data on measured variables were handled within the estimation framework so as to retain all available cases. Because the constructs were assessed with the same instruments at each wave, the measurement portion of each model was identified across time, allowing the autoregressive and cross-lagged parameters to be interpreted as prospective effects net of prior standing.

We then estimated three autoregressive cross-lagged mediation models, one per support source. Autoregressive cross-lagged models are well suited to the present aims because they estimate the prospective effect of each construct on another while controlling for the outcome's prior level, thereby providing a conservative and directionally informative test of hypothesized processes [10]. In each model, the focal Time 1 support variable predicted Time 2 bicultural acceptance and perceived health, which then predicted Time 3 life satisfaction; autoregressive paths linked each construct to its earlier measurement; and the covariates were included as exogenous predictors. Indirect effects, including the serial pathway through bicultural acceptance and perceived health, were tested with bias-corrected bootstrap confidence intervals [31]; an indirect effect was considered statistically significant when its 95% confidence interval excluded zero. Probability values returned by the software as .000 are reported as $p < .001$.

Results

Descriptive statistics and correlations

Means, standard deviations, and the full within- and cross-wave correlation matrix are presented in Table 3. On their respective scales, the study variables occupied moderate-to-high positions. Peer relationships remained high and stable across the three waves ($M = 3.80$ to 3.86 on a 5-point scale). Teacher support was similarly high but showed a curvilinear pattern, declining from Time 1 ($M = 3.86$) to Time 2 ($M = 3.74$) before partially recovering at Time 3 ($M = 3.83$); the Time 2 dip coincided with the first pandemic-affected school year and may reflect reduced teacher contact. Parental support declined monotonically from Time 1 ($M = 3.34$) to Time 3 ($M = 3.24$). Bicultural acceptance was stable at a low-to-moderate level ($M = 2.94$ to 2.96 on a 4-point scale), whereas perceived health ($M = 3.49$ to 3.45) and life satisfaction ($M = 3.35$ to 3.21) declined modestly over time, consistent with the well-documented age-graded decline in adolescent well-being.

All study variables were positively intercorrelated within and across waves ($r = .12$ to $.51$, all $p < .01$), supporting the plausibility of the hypothesized model. Within each wave, the association between perceived health and life satisfaction was among the strongest observed (Time 1 $r = .47$; Time 2 $r = .42$;

Time 3 $r = .50$), foreshadowing the central mediating role that perceived health would assume in the structural models. Peer relationships were consistently and moderately related to both perceived health and life satisfaction, whereas bicultural acceptance showed comparatively smaller but reliably significant correlations with the remaining constructs ($r = .16$ to $.46$), a pattern anticipating its more modest, largely indirect structural contribution. Each construct exhibited moderate autoregressive stability, with same-variable correlations in the high .20s to mid .40s (for example, peer relationships Time 1 to Time 2 $r = .41$; parental support Time 2 to Time 3 $r = .48$); peer relationships and life satisfaction were the most stable. Cross-lagged correlations indicated that earlier social support and bicultural acceptance were associated with later perceived health and life satisfaction, and that earlier perceived health was the single strongest correlate of later life satisfaction. This descriptive pattern is consistent with a support to bicultural acceptance to perceived health to life satisfaction sequence and justified the subsequent autoregressive cross-lagged mediation analyses; the moderate magnitude of the stability coefficients also indicated that the constructs were neither so stable as to preclude the detection of cross-lagged effects nor so unstable as to suggest unreliable measurement.

Model 1: peer relationships

Standardized direct effects for all three models are reported in Table 4 and displayed in Fig. 2, the key indirect effects for all three models are summarised in Table 5, and complete indirect-effect estimates, including every covariate pathway, are reported in Tables 6, 7 and 8. In Model 1, Time 1 peer relationships strongly predicted Time 2 bicultural acceptance ($\beta = .272$, $p < .001$), indicating that adolescents with more supportive peer relationships subsequently reported more positive attitudes toward both cultures, even after adjustment for prior bicultural acceptance. Peer relationships also exerted a small but significant direct effect on Time 3 life satisfaction ($\beta = .064$, $p = .013$). Within the mediating chain, Time 2 bicultural acceptance predicted Time 2 perceived health ($\beta = .085$, $p = .001$), perceived health predicted Time 3 life satisfaction ($\beta = .105$, $p < .001$), and bicultural acceptance additionally predicted life satisfaction directly ($\beta = .100$, $p < .001$).

Bootstrap tests confirmed the hypothesized indirect pathways. Peer relationships predicted life satisfaction through perceived health ($\beta = .021$, 95% CI [.013, .031]), through bicultural acceptance ($\beta = .015$, 95% CI [.007, .025]), and through the serial pathway from bicultural acceptance to perceived health to life satisfaction ($\beta = .008$, 95% CI [.005, .012]). Although each indirect effect was small in absolute terms, all three confidence intervals excluded zero, and their convergence across distinct mediational routes strengthens confidence in the process. Among the covariates (Table 6), worry about school life produced a significant negative indirect effect through perceived health ($\beta = -.010$, 95% CI [-.018, -.003]), whereas educational aspiration produced a positive serial indirect effect ($\beta = .004$, 95% CI [.002, .007]), indicating that everyday academic concern and future orientation operate in opposing directions on later well-being.

Model 2: teacher support

Model 2 reproduced the pattern observed for peer relationships with a school-based source of support. Time 1 teacher support significantly predicted Time 2 bicultural acceptance ($\beta = .186, p < .001$) and had a small but significant direct effect on Time 3 life satisfaction ($\beta = .046, p = .045$). Bicultural acceptance predicted perceived health ($\beta = .088, p < .001$) and life satisfaction ($\beta = .110, p < .001$), and perceived health predicted life satisfaction ($\beta = .107, p < .001$). The indirect effect of teacher support through perceived health was significant ($\beta = .017, 95\% \text{ CI } [.010, .027]$), as were the effects through bicultural acceptance ($\beta = .014, 95\% \text{ CI } [.007, .023]$) and through the serial pathway ($\beta = .007, 95\% \text{ CI } [.005, .011]$). As in Model 1, worry about school life exerted a significant negative indirect effect through perceived health ($\beta = -.011, 95\% \text{ CI } [-.020, -.004]$); complete estimates appear in Table 7. That a school-based relationship reproduced the cultural and health-mediated pattern found for peers indicates that teacher support functions as a developmental resource for cultural adaptation and well-being, not merely as a conduit for academic assistance.

Model 3: parental support

Model 3 yielded the strongest indirect effects of the three models. Time 1 parental support predicted Time 2 bicultural acceptance ($\beta = .279, p < .001$), which in turn had a substantial direct effect on Time 3 life satisfaction ($\beta = .210, p < .001$) and predicted perceived health, which predicted life satisfaction. Notably, the direct pathway from parental support to life satisfaction was comparatively limited, indicating that parental support operated predominantly through cultural and health-related mechanisms rather than through a direct effect. Parental support predicted life satisfaction through perceived health ($\beta = .036, 95\% \text{ CI } [.024, .054]$), through bicultural acceptance ($\beta = .027, 95\% \text{ CI } [.012, .044]$), and through the serial pathway ($\beta = .013, 95\% \text{ CI } [.009, .020]$); all three exceeded the corresponding effects in Models 1 and 2. The full model again showed a significant negative serial indirect effect for worry about school life ($\beta = -.002, 95\% \text{ CI } [-.005, -.001]$); complete estimates appear in Table 8. The prominence of the indirect over the direct pathway is theoretically informative: it suggests that, by early adolescence, the influence of parental support on life satisfaction is increasingly transmitted through the cultural and health-related self-evaluations that parents help to cultivate, rather than operating in an unmediated fashion.

Covariate patterns across models

Several patterns recurred across the three models and merit emphasis. First, school-related worries were consistently associated with lower life satisfaction: worry about school life produced a significant negative indirect effect through perceived health in every model, and worries about academic performance and about educational or career plans showed comparable negative tendencies, although several of their confidence intervals included zero. This pattern identifies everyday academic stress as a health-mediated risk pathway that can offset the benefits of relational and cultural resources. Second, growth-related resources operated in the opposite direction: educational aspiration, and in some models the number of close friends, produced small but significant positive indirect effects through perceived health and through the serial pathway. Third, the effects of sex and age were generally very small;

because the sign of the sex dummy depends on its coding, these coefficients should be interpreted in conjunction with the coding scheme in the final analytic dataset. Finally, although the absolute magnitude of most indirect effects was small (generally $|\beta| < .05$), the estimates were stable and their confidence intervals were narrow, reflecting the large sample. This configuration is consistent with a developmental account in which well-being is shaped by the accumulation of many small, reliable psychosocial influences rather than by a few large ones.

A comparison across the three models further sharpens the interpretation. The structure of the mediation was strikingly consistent regardless of the support source: in every model, support predicted bicultural acceptance most strongly, bicultural acceptance predicted perceived health, and perceived health predicted life satisfaction, while the pathway running through perceived health carried the most reliable indirect effect. What differed across models was magnitude rather than form. The predictive effect of support on bicultural acceptance was largest for parental support ($\beta = .279$) and peer relationships ($\beta = .272$) and smaller for teacher support ($\beta = .186$), and the total indirect effects were correspondingly largest in the parental-support model. This ordering is developmentally coherent: family and peer relationships are the most intimate and pervasive contexts of early adolescence, whereas the homeroom-teacher relationship, though influential, is more circumscribed. The invariance of the mediational form across sources, combined with the graded differences in magnitude, indicates that the same underlying process, in which relational support feeds cultural and health-related self-evaluations, operates across the adolescent's social ecology, with its strength scaled to the closeness and continuity of each relationship.

Discussion

This study examined how social support contributes to life satisfaction among multicultural adolescents in South Korea through the sequential mediation of bicultural acceptance and perceived health. Using three waves of national panel data and autoregressive cross-lagged modeling, the analyses supported a developmental account in which well-being emerges from cumulative relational, cultural, and health-related processes. Peer relationships, teacher support, and parental support each predicted later bicultural acceptance and perceived health, and these mediators predicted subsequent life satisfaction, consistent with Hypotheses 1 through 3. The convergence of results across three distinct support sources, each analyzed within an identical mediation structure, lends robustness to this conclusion and reduces the likelihood that it reflects a peculiarity of any single relational context.

The most consistent finding was the central role of perceived health. Across all three models, perceived health provided the most stable and robust pathway linking social support to life satisfaction, and it was the strongest cross-lagged correlate of later life satisfaction in the descriptive data. This result suggests that adolescents' self-rated health captures far more than physical condition; it appears to function as an integrative appraisal of psychological security, embodied adjustment, and social functioning. When multicultural adolescents feel supported by friends, teachers, and parents, and when they positively accept both of their cultural worlds, they appear more likely to evaluate their health favorably, and this

favorable health perception subsequently elevates their life satisfaction. The finding aligns with broader evidence that supportive relationships are consequential for health and, through health, for well-being [8], and it identifies perceived health as a strategic leverage point for intervention.

Why should perceived health occupy such a central position? One interpretation is that self-rated health functions as a summary appraisal that condenses diverse experiences of support, security, and cultural belonging into a single, readily accessible judgment about how one is faring. In this view, relational and cultural resources do not bypass the body and the emotions on their way to life satisfaction; rather, they are registered as a felt sense of vitality and adjustment, which the adolescent then draws upon when evaluating life as a whole. This interpretation is consistent with the observation that perceived health mediated the effects of all three support sources and of bicultural acceptance alike, as would be expected of a common downstream appraisal. It also accords with developmental evidence that the embodied and emotional dimensions of well-being become increasingly integrated during early adolescence. Practically, this implies that efforts to improve adolescents' self-rated physical and mental health, through for example physical activity, sleep, emotional regulation, and access to school-based mental-health services, may yield broad dividends for life satisfaction, complementing interventions that target relationships and cultural identity more directly.

Bicultural acceptance also emerged as a meaningful developmental resource, though its influence was more distributed between direct and indirect routes. Rather than functioning primarily as a source of vulnerability, a positive, integrated orientation toward both Korean and heritage cultures predicted higher life satisfaction directly and, in addition, predicted more favorable perceived health, which further predicted life satisfaction. This dual pathway is consistent with acculturation theory's contention that an integration orientation supports coherent identity and reduces identity-related strain [6, 14, 21] and with evidence that ethnic-identity affirmation benefits the well-being of immigrant-background youth [22]. The comparatively modest magnitude of the bicultural acceptance pathways, relative to the health pathways, suggests that cultural acceptance contributes to well-being in part by shaping how adolescents experience their own health and adjustment, rather than acting solely as an independent determinant.

The three-model design also clarified the differentiated functions of peer, teacher, and parental support. Peer relationships were important for cultural acceptance and life satisfaction, a developmentally sensible result given that peer belonging becomes increasingly central during the late-elementary transition. Teacher support reproduced this protective, culturally mediated pattern, underscoring that school relationships serve developmental as well as instructional purposes and that teachers occupy a strategic position for supporting culturally diverse students. Parental support exhibited the strongest indirect effects, and its influence operated primarily through the mediators rather than directly. Taken together, these patterns indicate that the family remains a foundational source of cultural and health-related self-evaluations even as adolescents' social worlds widen, and that the school context is a critical complementary arena in which those evaluations can be reinforced or undermined.

These results both converge with and extend the existing Korean literature. Prior studies have reported that social support predicts multicultural adolescents' life satisfaction and that bicultural acceptance is associated with better psychological adjustment and, in turn, with life satisfaction [2, 23, 24, 33]. The present findings integrate these separate associations into a single, longitudinally tested process and add the novel observation that perceived health is the most consistent conduit linking support to well-being, a mediator that has received comparatively little attention in this literature. The observation period also spans the onset of the COVID-19 pandemic, which coincided with the temporary decline in teacher support at Time 2 and may have amplified the salience of health-related self-evaluations. Although the design cannot isolate pandemic effects, this context underscores the value of a health-mediated account of adolescent well-being and suggests that periods of disruption may heighten the importance of the very resources examined here. Interpreted together, the findings reinforce a developmental, process-oriented understanding of multicultural adolescents' well-being that is responsive to changing social conditions.

Theoretical contributions

The study makes three contributions to the literature. First, it reorients research on multicultural adolescents from a deficit framing toward a resource framing. By demonstrating that social support, bicultural acceptance, and perceived health operate as linked assets that promote life satisfaction over time, the findings complement the substantial body of work documenting the risks these adolescents face and specify concrete protective mechanisms on which intervention can build. Second, the study integrates social-support and acculturation perspectives that are often pursued separately. Showing that support from peers, teachers, and parents fosters bicultural acceptance, which in turn supports perceived health and life satisfaction, bridges these literatures and articulates a coherent process linking relational context to cultural adaptation to well-being. Third, and methodologically, the study advances the field by testing this process with a three-wave autoregressive cross-lagged design. Because the models adjust for prior standing and estimate prospective, directionally specified effects, they provide stronger evidence for the hypothesized ordering than the cross-sectional mediation designs that dominate this area [9, 10], even though, as noted below, causal claims remain provisional.

Practical implications

The findings carry several implications for schools, families, and youth policy. First, programs for multicultural adolescents should extend beyond their traditional emphasis on language and academic adaptation to strengthen peer inclusion, teacher sensitivity, bicultural competence, and health-promoting self-perceptions in an integrated fashion, because these resources were found to operate as a connected system rather than in isolation. Second, the salience of teacher support suggests that professional development for teachers is a high-leverage investment: teachers shape the classroom climate that determines whether culturally diverse students feel recognized, and their support fed the same cultural and health-mediated pathway as peer and parental support. Third, family-based support remains indispensable; parent-education and family-counseling programs should help parents affirm

both the Korean and the heritage cultural backgrounds of their children, given that parental support exerted its influence largely through bicultural acceptance and perceived health. Fourth, because school-related worries eroded life satisfaction through perceived health, interventions should couple academic support with mental-health promotion and cultural-identity support, addressing stress and resources simultaneously. Because the pathway through perceived health was the most consistent across models, strategies that improve adolescents' self-rated physical and mental health may be an especially efficient means of promoting life satisfaction.

Finally, although the study is situated in the South Korean context, its implications are likely to extend to other societies undergoing rapid diversification. The constructs at the center of the model, namely relational support, bicultural acceptance, and perceived health, are grounded in general theories of development, acculturation, and well-being rather than in features unique to Korea, and comparable serial processes may operate wherever immigrant-background youth negotiate two cultural systems within family and school contexts. At the same time, the strength and shape of these pathways may depend on the receiving society's level of multicultural receptivity, the salience of particular heritage cultures, and the structure of its schooling. The Korean case, characterized by relatively recent and rapid diversification alongside comparatively low multicultural acceptance, may represent a context in which relational and cultural resources are especially consequential precisely because the surrounding environment is less accommodating. Cross-national replication, and comparison across settings that vary in receptivity, would clarify which elements of the process are general and which are context-dependent, thereby situating the present findings within a broader comparative understanding of immigrant-youth development.

Limitations and future research

Several limitations qualify these conclusions and suggest directions for future work. First, all constructs were assessed by adolescent self-report, raising the possibility of common-method bias; future studies would benefit from multi-informant designs incorporating parent, teacher, and administrative data, and from measurement approaches that separate method from trait variance. Second, although the three-wave autoregressive cross-lagged design strengthens temporal inference, the study is observational, and unmeasured confounding and reciprocal influences cannot be excluded; experimental or quasi-experimental evaluations of support-based interventions would provide more definitive causal evidence. Third, the three support sources were modeled separately to compare their functioning under an identical structure; a fully integrated model that includes all sources simultaneously would allow estimation of their unique and combined contributions and is a natural next step. Fourth, complete global fit indices for the final models were not available in the source output. [AUTHORS TO COMPLETE: report the chi-square statistic and its degrees of freedom, CFI, TLI, RMSEA, and SRMR for each model, together with the invariance-testing results, in the Results section, and revise or delete this limitation accordingly.] Fifth, multicultural adolescents are a heterogeneous population, and the present models treated them as a single group; future research should examine whether the pathways vary by family type, parental country of origin, nativity and generation status, language background, socioeconomic

status, and gender, and should consider whether the partial pandemic overlap of the observation period conditioned the estimates. Addressing these questions would refine understanding of for whom, and under what conditions, social support and bicultural acceptance most strongly promote life satisfaction.

Conclusions

This three-wave longitudinal study demonstrated that social support from peers, teachers, and parents contributes to life satisfaction among multicultural adolescents in South Korea through the sequential mediation of bicultural acceptance and perceived health. Across all three models, perceived health emerged as the most consistent mediating pathway, bicultural acceptance exerted both direct and indirect effects through perceived health, and parental support showed the strongest overall indirect influence. These findings suggest that multicultural adolescents' well-being develops through interconnected relational, cultural, and health-related processes rather than through isolated influences. Accordingly, interventions should adopt an integrated approach that strengthens supportive relationships, promotes bicultural acceptance, and fosters health-supportive environments across both family and school contexts.

Abbreviations

ARCL: autoregressive cross-lagged

CFI: comparative fit index

CI: confidence interval

MAPS: Multicultural Adolescents Panel Study

RMSEA: root mean square error of approximation

SD: standard deviation

SEM: structural equation modeling

SRMR: standardized root mean square residual

T1, T2, T3: Time 1 (2019), Time 2 (2020), Time 3 (2021)

TLI: Tucker-Lewis index

Declarations

Ethics approval and consent to participate

This study is a secondary analysis of de-identified public-use data from the Multicultural Adolescents Panel Study, collected by the National Youth Policy Institute, Republic of Korea. Ethics approval for this study was granted by the Institutional Review Board of Hanyang University, Seoul, Republic of Korea (approval number HYUIRB-202606-001). Because the study involved only the secondary analysis of de-identified data that had already been collected, the Institutional Review Board determined that informed consent from the participants or from their parents or legal guardians was not required for this study. All methods were carried out in accordance with the Declaration of Helsinki and with applicable national regulations and institutional guidelines.

Consent for publication

Not applicable. The manuscript contains no data relating to any identifiable individual.

Availability of data and materials

The data that support the findings of this study are available from the National Youth Policy Institute, Republic of Korea, through the Multicultural Adolescents Panel Study public-use data service. Restrictions apply to the availability of these data, which were used under the data provider's terms of use for the current study, and the data are available from the National Youth Policy Institute subject to its access procedures.

Competing interests

The authors declare that they have no competing interests.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. No funder had any role in the conceptualisation or design of the study, in the collection, analysis, or interpretation of the data, in the decision to publish, or in the preparation of the manuscript.

Authors' contributions

SW conducted the statistical analyses and drafted the manuscript. SK supervised the study and critically revised the manuscript for important intellectual content. Both authors contributed to the conceptualisation of the study and to the interpretation of the findings, and both authors read and approved the final manuscript.

Acknowledgements

The authors thank the National Youth Policy Institute for collecting and providing the Multicultural Adolescents Panel Study data.

Authors' information

Not applicable.

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Tables

Tables 1 to 8 are available in the Supplementary Files section.

Figures

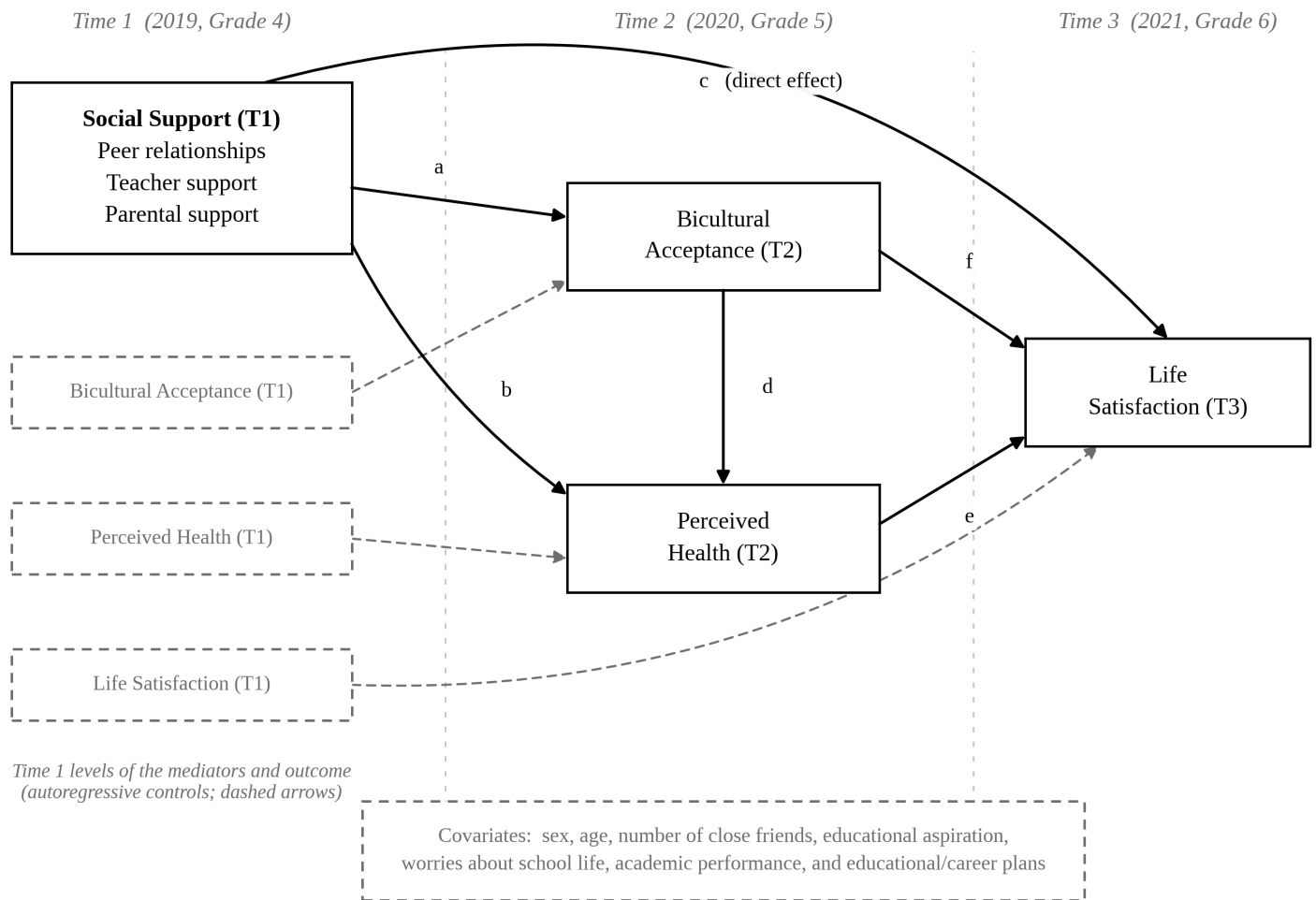
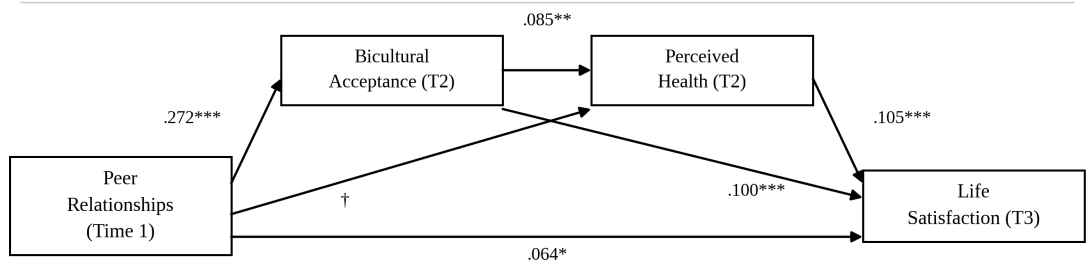


Figure 1

Conceptual model of the autoregressive cross-lagged serial mediation analysis

T1 = 2019 (fourth grade); T2 = 2020 (fifth grade); T3 = 2021 (sixth grade). Three parallel models were estimated, one for each source of social support (peer relationships, teacher support, parental support). Solid arrows denote the hypothesized structural paths: a, support to bicultural acceptance; b, support to perceived health; c, support to life satisfaction (direct effect); d, bicultural acceptance to perceived health; e, perceived health to life satisfaction; f, bicultural acceptance to life satisfaction. The serial mediation pathway is a to d to e. Dashed arrows and dashed boxes denote autoregressive paths and covariates, which were estimated but are not of substantive interest. Measurement models are omitted for clarity.

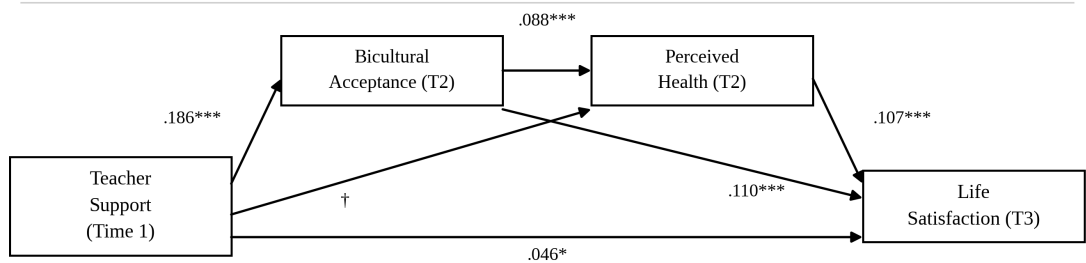
(A) Model 1: Peer relationships



Indirect effects on life satisfaction (T3), bias-corrected bootstrap 95% CI

• via perceived health	$\beta = .021$	[.013, .031]
• via bicultural acceptance	$\beta = .015$	[.007, .025]
• serial: BA $\rightarrow$ PH	$\beta = .008$	[.005, .012]

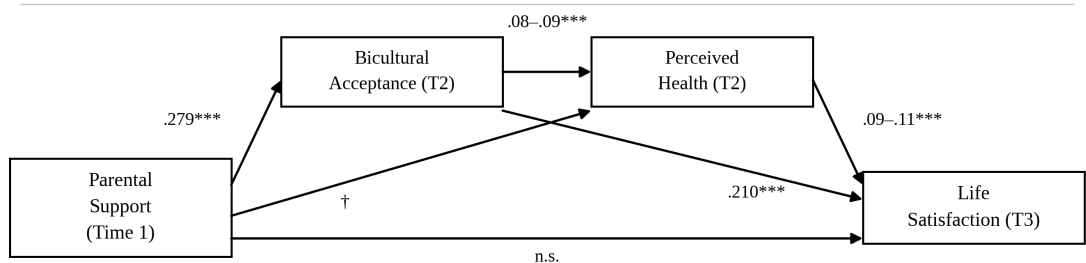
(B) Model 2: Teacher support



Indirect effects on life satisfaction (T3), bias-corrected bootstrap 95% CI

• via perceived health	$\beta = .017$	[.010, .027]
• via bicultural acceptance	$\beta = .014$	[.007, .023]
• serial: BA $\rightarrow$ PH	$\beta = .007$	[.005, .011]

(C) Model 3: Parental support



Indirect effects on life satisfaction (T3), bias-corrected bootstrap 95% CI

• via perceived health	$\beta = .036$	[.024, .054]
• via bicultural acceptance	$\beta = .027$	[.012, .044]
• serial: BA $\rightarrow$ PH	$\beta = .013$	[.009, .020]

Note. Values are standardized path coefficients. a = support $\rightarrow$ bicultural acceptance; b = support $\rightarrow$ perceived health; c = support $\rightarrow$ life satisfaction (direct); d = bicultural acceptance $\rightarrow$ perceived health; e = perceived health $\rightarrow$ life satisfaction; f = bicultural acceptance $\rightarrow$ life satisfaction. Autoregressive paths and covariates (sex, age, number of close friends, educational aspiration, and worries about school life, academic performance, and educational or career plans) were estimated but are omitted for clarity. BA = bicultural acceptance; PH = perceived health. † Path estimated in the model but its coefficient is not reported in Table 4; the corresponding indirect effect was significant. n.s. = not significant.

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

Figure 2

Standardized estimates for the three autoregressive cross-lagged serial mediation models

N = 2,271 at Time 1. Values are standardized path coefficients from three separately estimated models: (A) peer relationships, (B) teacher support, and (C) parental support. The dagger indicates that the path from support to perceived health was estimated in each model but its coefficient is not reported in Table

4; the corresponding indirect effect was statistically significant in all three models. Autoregressive paths and covariates (sex, age, number of close friends, educational aspiration, and worries about school life, academic performance, and educational or career plans) were estimated but are omitted for clarity. Confidence intervals are bias-corrected bootstrap 95% intervals; intervals excluding zero indicate a significant indirect effect. BA = bicultural acceptance; PH = perceived health; n.s. = not significant. * $p < .05$; ** $p < .01$; *** $p < .001$.

Supplementary Files

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