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ORIGINAL PAPER

Three-Wave Longitudinal Study of a Dual-Factor Model: Mental Health Status and Academic Outcomes for High School Students in Academically Accelerated Curricula

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Abstract

A dual-factor model (DFM) of mental health conceptualizes complete mental health as both low levels of psychopathology and high levels of subjective well-being (SWB). Although middle adolescence (ages 14 to 18 years old) is associated with increases in symptoms of psychopathology and declines in SWB, further research is needed to understand how youths' membership in a DFM changes across multiple time points. This study analyzed the stability of a DFM for students enrolled in accelerated coursework, and the relationship between initial mental health status and immediate and distal academic outcomes (i.e., student engagement and grade point average). A sample of 328 students reported on well-being, symptoms of psychopathology, and engagement (affective, behavioral, and cognitive) during the 9th grade fall, 9th grade spring, and 10th grade spring. School records indicated grade point averages at the end of 9th and 10th grade. Findings indicated that approximately 53% of youth changed mental health status over time, frequently due to a simultaneous increase in psychopathology and decrease in SWB. Results from multilevel modeling indicated that, regardless of level of psychopathology, initial low levels of SWB significantly predicted lower academic performance and student engagement over time compared to complete mental health (i.e., high SWB in combination with low psychopathology). Given students' declining mental health across 9th and 10th grade, and the relationship between mental health and academic outcomes, educators should consider monitoring and fostering both positive and negative indicators of mental health during the start of high school.

Keywords Psychopathology · Subjective well-being · Middle adolescence · Academic performance · Student engagement

A dual-factor model (DFM) provides a framework for assessing and targeting youth's mental health that recognizes both negative indicators (i.e., mental illness) and positive indicators (i.e., mental wellness; Suldo & Doll, 2021). Middle adolescence—a period of development from ages 14 to 18 years—is associated with deterioration in both dimensions of mental health (Antaramian & Huebner, 2009; García-Moya et al., 2019). Research links heightened mental illness and low mental wellness to lower student engagement and academic achievement (Moore et al., 2019; Suldo et al., 2016). Youth enrolled in accelerated curricula like Advanced Placement (AP) courses, or the International Baccalaureate Diploma (IBD) program may face increased levels of academic burnout and associated mental health concerns (e.g., depression, decreased well-being; Raiziene et al., 2013; Salmela-Aro et al., 2008; Suldo et al., 2018).

Literature on the stability of adolescents' mental health status within a DFM is still emerging, with the majority of existing studies analyzing changes across two time points for youth in general education (e.g., Kelly et al., 2012; Xiong et al., 2017). Studies also have yet to examine related changes in student engagement and academic performance across multiple time points, which could yield a more comprehensive understanding of the relationship between mental health and both immediate and long-term academic outcomes. This understanding may guide the delivery of school-based mental health supports by identifying when subgroups of students are most at-risk for academic difficulties. Using data collected across three time points (9th grade fall, 9th grade spring, and 10th grade spring), this study analyzed the mental health trajectories of students in AP and IBD courses, as well as the

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relationship between initial mental health status and academic adjustment (i.e., student engagement and GPA) over time.

Defining Mental Health

A traditional model of mental health views mental *illness* as the presence of psychopathology (i.e., internalizing and externalizing symptoms that result in maladaptive outcomes, such as anxiety, depression, or conduct disorder) and mental *health* as the absence of psychopathology (Seligman & Csikszentmihalyi, 2000). A growing literature highlights several limitations to this model. First, the traditional model hinders the prevention of mental disorders, since individuals receive treatment after obtaining a diagnosis (Seligman & Csikszentmihalyi, 2000). Second, research suggests that normality and abnormality exist on a continuum, with psychological disorders at the more extreme end of ordinary problems in living (Maddux, 2005). The traditional model of mental health fails to acknowledge this continuum of maladaptive thoughts and behaviors. Finally, the traditional model promotes a system of diagnosis and treatment based solely on identifying symptoms of psychopathology, providing limited information on how to reduce levels of symptomology (Maddux, 2005).

A DFM of mental health, first proposed by Greenspoon and Saklofske (2001), addresses issues with the more traditional model of mental health by conceptualizing *complete mental health* as both low levels of psychopathology and high levels of subjective well-being (SWB; Suldo et al., 2016). SWB is "a scientific term for happiness" that encompasses life satisfaction, positive affect (experiencing pleasant emotions and moods), and negative affect (experiencing negative emotions and moods; Suldo et al., 2016, pp. 434–435). Individuals with high SWB report high life satisfaction and experience more frequent positive affect than negative affect (Diener et al., 2009). Considering both positive and negative indicators of mental health results in four mental health quadrants: complete mental health (low psychopathology and average-to-high SWB), symptomatic but content (elevated psychopathology and average-to-high SWB), vulnerable (low psychopathology and low SWB), and troubled (elevated psychopathology and low SWB; see Table 1). This terminology aligns with the mental health groups described by Suldo and Shaffer (2008). Several studies demonstrate the prevalence of all four mental health groups during adolescence (Lyons et al., 2012; Rose et al., 2017; Suldo et al., 2016).

Table 1 Mental health groups within a dual-factor model of mental health

	Level of subjective well-being	
Level of psychopathology	Average to high	Low
Elevated	Symptomatic but content youth	Troubled youth
Low	Complete mental health youth	Vulnerable youth

Mental Health in Middle Adolescence

The period of development between ages 14 and 18 years (i.e., middle adolescence) is characterized by several unique factors, such as physical changes, increased academic stress, and new social experiences (e.g., new peer groups, romantic relationships, shifting family dynamics). As students enter high school, they often experience a completely departmentalized curriculum for the first time, as well as heightened pressure from class rankings and deciding who they are and who they want to be (Benner & Graham, 2009). Research indicates that both positive and negative indicators of mental health deteriorate during middle adolescence. For example, Benner and Graham (2009) collected data on youths' symptoms of psychopathology twice a year from 7 to 10th grade. Students' anxiety increased at the end of middle school, and feelings of loneliness significantly increased during high school (Benner & Graham, 2009). García-Moya et al. (2019) found that youth in Sweden experienced decreases in positive school experiences and increases in emotional and conduct problems between ages 12 and 15 years. Other research indicates that students' life satisfaction tends to decrease across middle adolescence, demonstrating the importance of the transition to early high school (Antaramian & Huebner, 2009; Goldbeck et al., 2007).

Some students enroll in accelerated coursework during high school (i.e., AP and IBD courses). Enrolling in these classes exposes high school students to college-level coursework and entails graduation requirements beyond state requirements (College Board, 2019). Many schools offer a limited number of AP or pre-IBD courses for 9th and 10th grade students to prepare them for 11th and 12th grade coursework (Suldo et al., 2018). Research suggests that students in AP or IBD courses face mental health concerns similar to those of normative samples of high school students within the USA (Suldo & Shaunessy-Dedrick, 2013a; Suldo et al., 2018). Youth in AP or IBD courses also may experience heightened feelings of academic burnout (Suldo et al., 2018), which positively predict depressive symptoms (Salmela-Aro et al., 2008) and negatively predict SWB (Raiziene et al., 2013). Despite the mental health risks for students in AP and IBD courses, the literature on the stability of a DFM has not focused on this population.

Stability of Mental Health Over Time

Research Examining Stability of Psychopathology

Most longitudinal research on the stability of mental health during adolescence focuses on psychopathology.

Reitz et al. (2005) examined the stability of externalizing and internalizing behavior in a sample of 650 8th grade students over a 1-year period. Correlations between Time 1 and Time 2 indicated moderate to high stability of symptoms for both girls ($r = 0.45–0.60$) and boys ($r = 0.49–0.61$; Reitz et al., 2005). Prenoveau et al. (2011) examined the stability of psychopathology for 627 high school students by measuring symptoms of depression, social phobia, and specific phobia across three time points, each one year apart. Symptoms of social anxiety and specific phobia demonstrated high relative stability ($r = 0.59–0.73$ and $r = 0.64–0.76$, respectively), whereas symptoms of depression demonstrated moderate stability ($r = 0.46–0.62$). Finally, Suldo and Shaunessy-Dedrick (2013a, 2013b) followed a sample of 134 students across two time points, from the summer after 8th grade to the fall of 9th grade. Students were in a pre-IBD program or general education courses. Results indicated that students experienced increases in externalizing symptoms of psychopathology over time, with no significant differences between students in the pre-IBD program and students in general education ($p = 0.75$). Neither group reported significant increases in internalizing symptoms (Suldo & Shaunessy-Dedrick, 2013a, 2013b). Although these studies reveal psychopathology's moderate to high stability during adolescence, interpretations of the results generally are limited to youth in general education.

Research Examining Stability of Well-Being

Research on trends in youth's well-being focuses on life satisfaction—a component of the more comprehensive construct of SWB (Antaramian & Huebner, 2009; Lewis et al., 2011). Antaramian and Huebner (2009) followed a sample of 84 8th grade students across three time points, each one year apart. Test–retest reliability coefficients revealed modest to moderate correlations across 1-year intervals ($r = 0.48–0.59$) and 2-year intervals ($r = 0.41–0.59$), with the exception of 1-year reliability for satisfaction with friends and self ($r = 0.29$ and 0.27, respectively). Lewis et al. (2011) used a longitudinal design to assess the life satisfaction of 864 7th and 8th grade students. Life satisfaction ratings were moderately stable ($r = 0.63$) across two time points separated by five months. Finally, Kiang and Ip (2018) followed 180 9th and 10th grade Asian-American students across four time points, each one year apart. Students with higher well-being demonstrated less stability over time than students with lower well-being (Kiang & Ip, 2018). In sum, research supports modest to moderate stability of life satisfaction during adolescence.

Research on the trajectory of life satisfaction during adolescence yields mixed results, with some studies indicating life satisfaction increases over time (e.g., Lewis et al., 2011; Steinmayr et al., 2019) and others indicating life satisfaction decreases over time (e.g., Goldbeck et al., 2007). For instance, Steinmayr et al. (2019) found increases in life satisfaction across four time points, each separated by one to two semesters, in a sample of 476 German adolescents (at Time 1, M age = 16.43, $SD = 0.55$). Further, students with higher grade point averages at the first time point experienced a larger increase in life satisfaction over time, whereas general intelligence scores were not associated with subjective well-being. Conversely, using cross-sectional data gathered from 1,274 German students' ages 11 to 16 years, Goldbeck et al. (2007) found that students' life satisfaction ratings decreased linearly across age-groups. Cavallo et al. (2015) also examined trends in adolescents' life satisfaction using a cross-sectional design. Data were gathered from representative samples of youth in 31 countries. Results indicated that life satisfaction tended to decrease over time for youth in most countries, with a marked drop occurring between the ages of 13 and 15 years old (Cavallo et al., 2015). Antaramian and Huebner (2009) found that means for satisfaction with family, friends, school, and self tended to decrease across two years, although mean differences were not statistically significant (Antaramian & Huebner, 2009). Suldo and Shaunessy-Dedrick (2013b) found that life satisfaction generally declined between the summer after 8th grade and the fall of 9th grade for youth in general education courses as well as youth in the pre-IBD program. More recently, Waters et al. (2019) examined trends in SWB across three time points, each six to eight months apart, for youth ages 12 to 15 years old. SWB tended to decline over time, with significant decreases in life satisfaction and positive affect and significant increases in negative affect. Notably, the existing literature on the stability of well-being is limited by a focus on life satisfaction rather than all components of SWB (e.g., positive and negative affect), as well as scarce study of trends for youth in AP and IBD courses.

Research Examining Stability of a Dual-Factor Model of Mental Health

A handful of longitudinal studies have explored the stability of adolescents' mental health status within a DFM, with the majority utilizing cut scores to determine students' mental health group. Kelly et al. (2012) assessed changes in students' group membership using two time points five months apart. Participants were 730 7th and 8th grade students. They used T-scores to classify youths' level of psychopathology and SWB. Results indicated that complete mental health was the most stable group, with 85% of participants classified as complete mental health at Time 1 remaining

at Time 2 (Kelly et al., 2012). Troubled and symptomatic but content youth demonstrated moderate stability (47% and 42% remaining, respectively), followed by vulnerable youth (29% remaining). Symptomatic but content youth were more likely to move to complete mental health than troubled youth (Kelly et al., 2012).

Xiong et al. (2017) extended Kelly et al.'s (2012) research to a sample of 531 Chinese middle school students. They gathered data at two time points four months apart and, like Kelly et al. (2012), used *T*-scores to determine the level of psychopathology. Based on Suldo and Shaffer's (2008) proposal that cut scores for SWB "correspond with the percentage of youth with high or low psychopathology" (p. 59), an SWB composite score above the 30th percentile indicated average-to-high SWB (Xiong et al., 2017). At Time 2, approximately 64% of students maintained their mental health status (Xiong et al., 2017). The complete mental health group was the most stable group (80.2% remaining). The troubled group was the least stable (34.5% remaining). Students considered vulnerable at Time 1 were most likely to transition to the complete mental health group (39.6%) or the troubled group (13.9%; Xiong et al., 2017).

McMahan (2012) followed 425 high school students across two time points one year apart. Like Xiong et al. (2017), the level of psychopathology was based on *T*-scores and the level of SWB was based on sample-specific percentiles. Approximately 60% of students maintained their mental health status across time, with the complete mental health group demonstrating the most stability (about 80% of students remaining). Approximately 36% and 30% of students remained in the troubled and vulnerable groups, respectively. The symptomatic but content group was the least stable, with 17% remaining at Time 2.

Finally, Moore et al. (2019) examined change in mental health status across three time points, each 1 year apart, for students in grades 9–11. Students were classified using latent profile analysis. This method resulted in four groups: complete mental health (i.e., lowest psychopathology, highest SWB), moderately mentally healthy (i.e., low psychopathology, average-to-high SWB), symptomatic but content (i.e., elevated psychopathology, average-to-high SWB), and troubled (i.e., elevated psychopathology, low SWB). About a quarter of students maintained their mental health status over time. The complete mental health group increased slightly from Time 1 (31%) to Time 2 (41%) and decreased at Time 3 (21%). The moderately mentally healthy group decreased from Time 1 (43%) to Time 2 (32%) and increased at Time 3 (44%). The troubled group was consistent over time (6%, 6%, and 4%, respectively), whereas the symptomatic but content group increased (20%, 21%, and 31%, respectively).

In sum, research indicates that the stability of a DFM during adolescence differs across students' mental health status, with higher levels of SWB and lower levels of psychopathology linked to greater stability. The literature is limited by the frequent use of two time points across a four-month to one-year span. Analyzing data across additional time points can further identify when adolescents are most at risk for deteriorating mental health, as well as which students are most likely to experience these deteriorations (e.g., symptomatic but content versus vulnerable youth). Additionally, the existing literature uses a variety of methods to identify mental health groups. Some researchers argue against the use of cut scores (e.g., Moore et al., 2019), since this method may not reflect all changes in students' mental health ratings (e.g., students who report a slight increase in SWB but remain below the cut score). Yet cut scores are a method of classification that school-based practitioners can utilize with their population, making them a useful method for translating research into practice. Finally, researchers have yet to extend research on the stability of a DFM to youth enrolled in accelerated coursework, despite this group's risk for heightened feelings of academic burnout and mental health difficulties.

Mental Health and Academic Adjustment

A limited number of studies report the relationship between students' mental health status within a DFM and immediate and distal academic adjustment. Suldo et al. (2011) followed 300 students in grades 6–8 across two time points one year apart. Students' SWB at Time 1 positively predicted GPA at Time 2, whereas students' externalizing—but not internalizing—symptoms at Time 1 negatively predicted GPA at Time 2 (Suldo et al., 2011). Students in the complete mental health group had the highest mean GPAs, and membership in the troubled group was linked to steeper declines in GPA than membership in the complete mental health or vulnerable group. Suldo et al. (2016) examined the relationship between students' mental health status and (a) concurrent beliefs about school and (b) academic performance in a sample of 500 students in grades 9–11. Students with complete mental health had higher academic self-perceptions (i.e., self-efficacy) and cognitive engagement than vulnerable students. Symptomatic but content students had more positive academic self-perceptions than troubled students. Groups with higher psychopathology had lower GPAs. Lyons et al. (2013) examined whether 727 middle school students' GPAs and school engagement (behavioral, cognitive, and affective) differed across a 5-month period based on students' mental health status. Results indicated that higher SWB significantly predicted higher school engagement but did not significantly predict GPA; however, GPA for the vulnerable group declined faster than GPA for the positive mental health group (Lyons et al., 2013). Moore et al. (2019) also investigated academic outcomes, with

students in the complete mental health and moderately mentally healthy groups (i.e., youth with average-to-high SWB) self-reporting higher grades over the last 12 months than the symptomatic but content group during grades 10 and 11. Group membership in a DFM therefore relates to and predicts academic functioning; however, given that the transition to high school is associated with decreases in youth's mental health (e.g., Benner & Graham, 2009; García-Moya et al., 2019), more research is needed to understand how the relationship between these variables changes across the start of high school.

The Current Study

The purpose of this study was twofold: (a) to address several gaps in the literature on a DFM of mental health and (b) to help inform school-based mental health practices. First, the study examines trends in mental health pathways across three time points, yielding a more nuanced understanding of when subgroups of students are at risk for deteriorating mental health. Second, the study uses clinically relevant cut scores to define group membership at each time point—a method that can be replicated in school settings. Third, given the dearth of research applying a DFM to youth enrolled in accelerated curricula, the study focuses on youth enrolled in AP or IBD. Finally, the study investigates the relationship between mental health status and high school students' academic outcomes to determine when—and which—students are most at risk for academic difficulties. The study includes measures of student engagement, in addition to GPA, to more fully assess behaviors, beliefs, and values that foster academic achievement. The study answered the following research questions:

1. For high school students enrolled in accelerated curricula, to what extent is group membership in the four quadrants of a DFM stable across three time points, each 9–12 months apart?
2. For high school students enrolled in accelerated curricula, is change in group membership due to change in psychopathology, SWB, or both?
3. For high school students enrolled in accelerated curricula, what is the relationship between group membership at Time 1 and:
    a. Students' academic performance at Times 2 and 3?
    b. Student engagement at Times 1, 2, and 3?

Method

Participants

The current study used archival data collected by the researchers during the 2017–2018 and 2018–2019 school years as part of a larger intervention study. At the start of 9th grade, participants were enrolled in 15 AP or IBD programs at 14 schools in three large districts in the Southeastern USA. A total of 533 students participated in data collection at Time 1 (9th grade fall). Of these students, 499 continued participation at Time 2 (9th grade spring; 93.6% return rate) and 328 continued participation at Time 3 (10th grade spring; 61.5% return rate for Time 1 sample; 65.7% for Time 2 sample). Demographic features for each time point are summarized in Table 2. Approximately 64% of participants received additional school-based supports through the Advancing Coping and Engagement (ACE) program. The ACE program involves (a) universal class-wide social emotional learning modules that strengthen students' effective coping styles and school engagement and (b) one to two individual Motivation, Assessment, and Planning (MAP) meetings with a mental health professional for a minority of students who report or show signs of academic or emotional risk. (For more information, see O'Brennan et al., 2020; Shaunessy-Dedrick et al., 2021.) See Data Analysis for how the researchers controlled for participation in the intervention (ACE program).

Measures

Brief Problem Monitor—Youth (BPM-Y)

The BPM-Y (Achenbach et al., 2011) measures internalizing, externalizing, and attention problems in youth ages 11 to 18 years. Using a scale ranging from 0 (*not true*) to 2 (*very true*), students rate 19 items while thinking about the past six months. *T*-scores ≥ 65 (93rd percentile for normative samples) are considered "sufficiently elevated to be of concern" (Achenbach et al., 2017, p. 2). Norms purchased from the test developer (ASEBA) indicate gender-specific cut scores for establishing *T*-scores. On the internalizing scale, a score of 5 indicates high internalizing problems for males and a score of 7 indicates high internalizing problems for females. On the externalizing scale, a score of 7 indicates high externalizing problems for both males and females. Achenbach et al. (2017) reported high test–retest reliability for the internalizing and externalizing scales of the BPM-Y ($r = 0.80$ and 0.85, respectively), as well as acceptable internal consistency ($\alpha = 0.78$ and 0.75, respectively). Both internalizing and externalizing scales also demonstrated acceptable

Table 2 Students' demographic characteristics and academic adjustment at times 1, 2, and 3

Variable	Time 1 ($N=533$)	Time 2 ($N=499$)	Time 3 ($N=328$)
		% of sample	
Gender			
Female	63.41	62.12	65.85
Male	36.59	37.88	34.15
Race/Ethnicity			
White	45.97	46.29	43.29
Black	7.13	6.81	6.71
Hispanic	21.39	20.84	22.56
Asian	11.26	12.02	14.63
Multiracial	14.26	14.03	12.80
Gifted Identification	31.89	32.26	35.98
		M (*SD*)	
SES	−0.002 (0.537)	0.008 (0.522)	0.005 (0.518)
Academic adjustment			
GPA	–	3.40 (0.62)	3.46 (0.56)
Behavioral Engagement	3.42 (0.45)	3.33 (0.50)	3.30 (0.52)
Affective Engagement	2.90 (0.46)	2.87 (0.46)	2.83 (0.48)
Cognitive Engagement	5.50 (1.04)	5.29 (1.10)	5.25 (1.13)

Socioeconomic status (SES) was measured by standardizing and averaging three variables: eligibility for free or reduced-price school lunch, highest education level completed by father, and highest education level completed by mother. Gifted identification refers to students identified as having "superior intellectual development and are capable of high performance" (Florida Department of Education, 2020). GPA = unweighted grade point average

internal consistency in a sample of middle school students (α = 0.82–0.88 and 0.74–0.82, respectively; Roth et al., 2017). In the current study, α = 0.85–0.87 for internalizing symptoms and α = 0.65–0.72 for externalizing symptoms.

Students' Life Satisfaction Scale (SLSS)

The SLSS (Huebner, 1991) measures general life satisfaction of students in grades 3–12. On a scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*), students indicate their level of agreement with seven statements about quality of life (e.g., "My life is just right"). Higher mean scores indicate higher global life satisfaction. Huebner (1991) reported high internal consistency for the SLSS (α = 0.82) and high test–retest reliability ($r=0.74$ and $r=0.68$). Suldo et al. (2016) and Lyons et al. (2012) also reported strong psychometric properties of the SLSS based on high school samples (α = 0.88 and 0.81, respectively). In the current study, α = 0.87–0.89.

10-Item Positive and Negative Affect Scale for Children (PANAS-C-10)

The PANAS-C-10 (Ebesutani et al., 2012) is a shortened version of the PANAS-C (Laurent et al., 1999) and measures the frequency of positive and negative emotions in youth. It consists of five items that measure the frequency of positive affect (e.g., interested, excited) and five items that measure the frequency of negative affect (e.g., gloomy, lonely). Participants rate the extent to which they experienced each feeling in the past few weeks on a scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Laurent et al. (1999) reported high internal consistency for the PANAS-C (α = 0.92 for negative affect, α = 0.89 for positive affect), as well as strong construct validity based on the magnitude and direction of relationships with anxiety ($r=$ -30 for positive affect, $r=0.68$ for negative affect) and depression ($r=$ -0.55 for positive affect, $r=0.60$ for negative affect). Ebesutani et al. (2012) reported strong psychometric properties of the PANAS-C-10 (α = 0.86 for positive affect, α = 0.82 for negative affect). In the current study, α = 0.87–0.90 for positive affect and α = 0.78–0.81 for negative affect.

Engagement Vs. Disaffection (EVD)

The behavioral engagement (BE) scale of the EVD measure (Skinner et al., 2009) contains five items that assess students' on-task behavior, effort, and attention in the classroom (e.g., "When I'm in class, I participate in class discussions"). Students respond using a scale ranging from 1 (*not at all true*) to 4 (*very true*). Higher mean scores indicate higher behavioral engagement. Scores on the BE scale

yield significant, moderate correlations with teacher ratings of students' behavioral engagement ($r = 0.32–0.37$; Skinner et al., 2009) and student academic achievement ($r = 0.26$; King & Gaerlan, 2014). Skinner et al. (2009) also report strong internal consistency ($\alpha = 0.61–0.72$). In the current study, $\alpha = 0.74–79$.

Identification with School Questionnaire (ISQ)

The complete ISQ (Voelkl, 1996) contains 16 items that measure students' valuing of school and their feelings of belonging at school. Students indicate their agreement using a scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). To index affective engagement, the current study utilized nine items measuring students' belonging, reflected by pride in school and feelings of respect by and attachment to teachers (e.g., "People at school are interested in what I have to say"). Higher mean scores indicate higher affective engagement. Voelkl (1996) reported high internal consistency ($\alpha = 0.76$), as well as evidence for construct validity from a confirmatory factor analysis. A study with high school students also yielded high internal consistency ($\alpha = 0.75$; Bos et al., 2008). In the current study, $\alpha = 0.76–0.82$.

School Attitude Assessment Survey—Revised (SAAS-R)

The complete SAAS-R (McCoach & Siegle, 2003) contains 35 items that measure students' beliefs related to school. Students indicate their agreement with each item using a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). To index cognitive engagement, this study utilized the motivation/self-regulation scale, which assesses students' efforts to maintain goal-directed academic behavior through strategizing and persistence (e.g., "I put a lot of effort into my schoolwork"). Higher mean scores indicate higher cognitive engagement. Prior research with high school students provides support for convergent validity (Suldo et al., 2008). Motivation and self-regulation were highly correlated with academic self-efficacy ($r = 0.68$) and demonstrated a significant, negative association with school-conduct problems ($r = -0.19$; Suldo et al., 2008). In this study, $\alpha = 0.91–0.92$.

School Records

Students' transcripts were obtained from each school district at the end of 9th grade (Time 2) and the end of 10th grade (Time 3). Grade point averages (GPAs) were calculated by adding numerical values to letter grades (A = 4.0, B = 3.0, C = 2.0, D = 1.0, F = 0.0) and dividing by the total number of attempted courses. Weighting procedures (e.g., awarding an additional whole point for AP and IBD courses) were not used in the current study.

Procedures

In August 2017 (Time 1), teachers distributed a parent consent form explaining the project's larger purpose (to understand students' school experiences in the context of a randomized controlled trial on the ACE intervention) and research activities to all 9th grade students in AP Human Geography or IBD Inquiry Skills. Students were informed that their responses would be kept confidential and participation was voluntary, and researchers obtained signed student assent. In April 2019 (Time 3), the research team invited all student participants from Time 1 who were still enrolled in the 14 partner schools to participate in a longitudinal follow-up study. At Time 3, school administrators (e.g., Assistant Principals) were charged with distributing and collecting consent forms. Variability in administrator time and support led to some differences in attrition at the school/program level. Return rates were reasonably high for 13 programs (70.3% to 100% of students from Time 1 returned consent forms to be eligible for Time 3; $M = 83.8\%$), whereas two outlier programs yielded return rates of only 7.1% and 32.7% ($M = 19.9\%$).

At each school, students with parent consent and student assent were assembled in a large space (e.g., auditorium, cafeteria) or met in their classrooms during a common class time to complete a packet of questionnaires under the supervision of the research team. Demographic data were collected at Time 1 only. Measures were arranged in four different orders, and versions were randomly assigned to students to reduce order effects. Each student received a $10 movie pass to a local theater or an iTunes gift card for completing the questionnaires. When a survey packet was completed, one member from the research team visually inspected each scale in the packet to ensure all items were complete and to check for errors in responding. Students were asked to complete or correct item(s) if necessary. The researchers then scanned the surveys into a secure database and checked the data for accuracy.

Data Analysis

As described in Suldo and Doll (2021), researchers have used different methods to group students according to their mental health needs. Methods include use of cut scores to assign group membership to all youth in a sample ranging from near the cut point to extreme scores (e.g., Suldo & Shaffer, 2008), cut scores that exclude youth with values in the middle of the distribution to sharpen contrasts between

groups (e.g., Greenspoon & Saklofske, 2001), and latent profile analysis to identify latent groups (i.e., classes, profiles) comprised of individuals with similar response patterns across mental health measures (e.g., Moore et al., 2019; Rose et al., 2017). Regardless of the method used to form groups, prior studies of a dual-factor model have consistently found support for four groups of students based on the presence or absence of wellness and psychopathology (Suldo & Doll, 2021). Since the purpose of the current study was to examine differences in these four groups defined by quadrants of a dual-factor model and use classification methods likely to translate most readily to school-based practice (i.e., assign each student to a mental health group), at each time point we assigned students to groups based on their scores on measures of psychopathology (BPM-Y) and SWB (SLSS, PANAS-C-10). Cut score methods mirrored those used in previous studies (Suldo & Shaffer, 2008; Suldo et al., 2016). Specifically, based on published norms from ASEBA, *T*-scores ≥ 65 (93rd percentile) on the BPM-Y internalizing and/or externalizing scale indicated an elevated level of psychopathology. Remaining students were classified as low psychopathology. An SWB composite variable was calculated by adding *z*-scores for life satisfaction and positive affect and subtracting *z*-scores for negative affect. Cut scores for students considered average to high in SWB were based on the percentile of students with elevated psychopathology at each time point. Recognizing that cut scores can be questioned, and that classification accuracy is imperfect, we conducted post hoc analyses to examine the effect of the cut scores used to establish group membership. Analyses were rerun using a few different values, in particular cut scores of $T \geq 62$ and $T \geq 66$ on the BPM-Y internalizing and/or externalizing scales. These *T*-score values correspond to one point below and one point above the original scores (e.g., for $T \geq 62$, scores for internalizing were 4 and 6 for males and females, respectively, and scores for externalizing were 6 for males and females).

Stability over time of mental health status was examined in two ways. First, McNemar tests were used to determine if the proportion of students in a particular mental health group increased or decreased over time. Second, the change in mental health status of individual students over time was examined by finding for each student their sequence of mental health statuses (e.g., complete mental health—> complete mental health—> troubled; or vulnerable—> troubled—> troubled). Students then were classified into 64 (i.e., 4^3) possible sequences or mental health trajectories to determine what proportion of students stayed consistent in their mental health status and what proportion of students changed. To determine if changes in mental health status were due to changes in psychopathology, changes in SWB, or both, students who changed mental health status over time were sorted into three change categories: change in level of psychopathology only, change in level of SWB only, and change in both dimensions. Chi-square tests for goodness of fit indicated if the proportions of students in each change category were significantly different.

To examine the relationship between mental health status and academic outcomes, multilevel models were estimated, which account for the nesting of students within school programs. A separate multilevel model was estimated for each of the four outcomes (GPA, and behavioral, cognitive, and affective engagement) at each time (Time 1, 2, and 3), with the exception that GPA was only modeled at Time 2 and 3. For each multilevel analysis, the dependent variable was modeled as a function of Time 1 mental health status, which was dummy coded such that those with complete mental health served as the reference group. In addition, an indicator variable was included to control for whether or not the student participated in the intervention.

$$DV_{ij} = \beta_{0j} + \beta_1 troubled + \beta_2 symptomatic + \beta_3 vulnerable + \beta_4 Intervention + u_{0j} + e_{ij}.$$

The student level errors, e_{ij}, and the school program level errors, u_{0j}, were assumed to be sampled independently from normal distributions with variances of σ_e^2 and σ_u^2, respectively. All models were estimated using restricted maximum likelihood techniques via the mixed procedure in SAS. Because we ran multiple models, we used an alpha of 0.01, instead of 0.05, to control the Type I error rate.

Results

Missing Data

The Time 1 sample of 533 students excluded two participants with more than two missing items on the BPM-Y, as recommended in the measure's technical manual. Rates of missing data were very low for students who completed questionnaires at all three time points ($n = 328$), with 0.07% of data points missing across all data points and no participant missing more than one item on any scale. For data gathered from school records, only one GPA value was missing (at Time 3). Analyses for the primary research questions used data from the 328 participants with the exception of the relationship between mental health status at Time 1 and GPA at Time 3 ($n = 327$; i.e., all students with GPA values).

Attrition analyses indicated that females left the study at a higher rate than males between Time 1 and Time 2, $\chi 2$ (1, $N = 205$) = 8.83, $p = 0.003$, whereas males left the study at a higher rate than females between Time 2 and Time 3, $\chi 2$ (1, $N = 499$) = 5.66, $p = 0.02$. Between Time 2 and Time 3, participants who identified as White, Asian, or multiracial left

the study at higher rates than those who identified as Black or Hispanic, $\chi 2$ (4, $N = 499$) = 9.68, $p = 0.046$. Students identified as gifted left the study at a lower rate between Time 2 and Time 3 than those not identified as gifted, $\chi 2$ (1, $N = 499$) = 6.03, $p = 0.01$. Students with elevated psychopathology at Time 1 did not leave the study at significantly higher rates at Time 2 and Time 3 than students without elevated psychopathology, $\chi 2$ (2, $N = 533$) = 4.16, $p = 0.13$. Students with low SWB at Time 1 left the study at higher rates between Time 1 and Time 2 than students with average-to-high SWB, $\chi 2$ (2, N = 205) = 12.29, p = 0.001, but not between Time 2 and Time 3, $\chi 2$ (2, N = 499) = 1.53, p = 0.22. Students in the troubled or vulnerable groups at Time 1 left the study at higher rates between Time 1 and Time 2 than those in the complete mental health or symptomatic but content groups, $\chi 2$ (3, $N = 205$) = 13.28, $p = 0.004$.

Question 1: Stability of Mental Health in a Dual-Factor Model

At each time point, variables within the SWB composite demonstrated moderate (r = -0.34 to -0.40 for positive affect and negative affect) to strong (r = 0.50 to 0.56 for life satisfaction and positive affect; r = -0.51 to -0.57 for life satisfaction and negative affect) correlations. At Time 1, 27.44% of students reported elevated psychopathology (81.11% internalizing, 6.67% externalizing, 12.22% comorbid internalizing and externalizing). Thus, SWB composite scores above the 27.44th percentile indicated average-to-high SWB at Time 1. The cut scores for Time 2 and Time 3 aligned with the 26.83rd percentile (80.68% internalizing, 11.36% externalizing, 7.95% comorbid) and the 36.28th percentile (85.71% internalizing, 4.20% externalizing, 10.08% comorbid), respectively. See Table 3 for the distribution of students within a DFM at each time point. The complete mental health group was the largest across time (approximately 52–63%), followed by the troubled group (approximately 16–25%) and the symptomatic but content and vulnerable groups (each approximately 9–11%).

Table 3 Proportion of participants classified in each mental health group

	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)
Complete mental health	207 (63.11)	204 (62.20)	172 (52.44)
Symptomatic but content	31 (9.45)	36 (10.98)	37 (11.28)
Vulnerable	31 (9.45)	36 (10.98)	37 (11.28)
Troubled	59 (17.99)	52 (15.85)	82 (25.00)

McNemar tests indicated that the proportion of students in the complete mental health group did not change significantly from Time 1 to Time 2 ($p = 0.73$) but decreased significantly from Time 2 to Time 3 ($p = 0.0006$; difference in proportions = 0.0976). The proportion of students in the symptomatic but content and vulnerable groups did not change significantly from Time 1 to Time 2 ($p = 0.52$ and 0.42, respectively) or from Time 2 to Time 3 ($p = 0.89$ and 0.89, respectively). The proportion of students in the troubled group did not change significantly from Time 1 to Time 2 ($p = 0.33$) but increased significantly from Time 2 to Time 3 ($p = 0.0003$; difference in proportions = 0.0915).

Of students who remained in the same group at all three time points (i.e., 4 of 64 possible trajectories), 37.80% ($n = 124$) remained in the complete mental health group, 0.61% ($n = 2$) remained in the symptomatic but content group, 1.22% ($n = 4$) remained in the vulnerable group, and 7.62% ($n = 25$) remained in the troubled group. Approximately 53% ($n = 173$) of students changed mental health status at least once (95% confidence interval = 0.47, 0.58). The most common changes were (a) a transition from complete mental health at Time 1 and Time 2 to vulnerable (4.88%), troubled (5.18%), or symptomatic but content (3.05%) at Time 3 and (b) a transition from symptomatic but content at Time 1 to complete mental health at Time 2 and Time 3 (3.35%). Remaining participants who changed groups were divided among 46 mental health trajectories (10 possible trajectories had 0 students), with the percentage of students in each ranging from 0.3% to 1.83%.

Question 2: Change in Psychopathology Versus Change in SWB

For students who changed mental health status at least once (i.e., 52.74% of the sample), 28.32% changed due to shifts in psychopathology only, 27.01% changed due to shifts in SWB only, and 45.66% changed due to shifts in both dimensions. Chi-square tests for goodness of fit indicated that the observed proportions of students with each change type were significantly different from the expected proportions of 33.33% for each group, χ^2 (2, $N = 173$) = 11.98, $p = 0.003$. Examination of the relative deviation of each type of change from the expected proportion indicated that the group representing changes in both psychopathology and SWB contributed the most to the chi-square statistic, with more students than the expected 33% demonstrating changes in both dimensions. Students with changes in level of psychopathology only and students with changes in level of SWB only contributed a moderate amount, with less students than the expected 33% demonstrating changes in only one dimension.

Question 3: Relationship Between Initial Mental Health Status and Academic Adjustment

Hierarchical linear modeling results for GPA, behavioral engagement, affective engagement, and cognitive engagement are displayed in Table 4.

Mental Health Status and GPA

For the two-level hierarchical model predicting students' academic performance at Time 2, neither the troubled ($b = -0.08$, $p = 0.31$), symptomatic but content ($b = 0.07$, $p = 0.52$), nor vulnerable ($b = -0.16$, $p = 0.12$) groups differed significantly from the complete mental health group. At Time 3, the vulnerable group differed significantly from the complete mental health group in academic performance, with membership in the vulnerable group predicting a 0.32 unit decrease in GPA ($p = 0.003$). Using an alpha of 0.01, GPA for the troubled ($b = -0.17$, $p = 0.04$) and symptomatic but content ($b = 0.07$, $p = 0.52$) groups did not significantly differ from the complete mental health group at Time 3.

Mental Health Status and Behavioral Engagement

At Time 1, the troubled ($b = -0.26$, $p < 0.0001$) and vulnerable ($b = -0.26$, $p = 0.001$) groups differed significantly from the complete mental health group in terms of behavioral engagement, whereas the symptomatic but content group did not ($b = -0.06$, $p = 0.46$). At Time 2 and Time 3, the troubled group differed significantly from the complete mental health group, with membership in the troubled group predicting a 0.28 unit ($p < 0.0001$) and 0.20 unit ($p = 0.008$) decrease in behavioral engagement, respectively, at each subsequent time point. The vulnerable ($b = -0.19$, $p = 0.04$; $b = -0.15$, $p = 0.13$) and symptomatic but content ($b = -0.03$, $p = 0.81$; $b = -0.01$, $p = 0.89$) groups did not significantly differ from the complete mental health group at Time 2 or at Time 3, respectively.

Mental Health Status and Affective Engagement

At Time 1, the troubled ($b = -0.52$, $p < 0.0001$), symptomatic but content ($b = -0.24$, $p = 0.001$), and vulnerable ($b = -0.45$, $p < 0.0001$) groups differed significantly from the complete mental health group in terms of affective engagement. At Time 2, the troubled and vulnerable groups differed significantly from the complete mental health group, with membership in the troubled group predicting a 0.37 unit decrease in affective engagement ($p < 0.0001$) and membership in the vulnerable group predicting a 0.35 unit decrease in affective engagement ($p < 0.0001$). The symptomatic but content group did not differ significantly from the complete mental health group ($b = -0.08$, $p = 0.32$). At Time 3, the troubled group and the vulnerable group again differed significantly from the complete mental health group ($b = -0.34$, $p < 0.0001$ and $b = -0.24$, $p = 0.006$, respectively), whereas the symptomatic but content ($b = -0.03$, $p = 0.71$) group did not.

Mental Health Status and Cognitive Engagement

At Time 1, the troubled ($b = -0.74$, $p < 0.0001$) and vulnerable ($b = -0.59$, $p = 0.001$) groups differed significantly from the complete mental health group in terms of cognitive engagement. The symptomatic but content group did not differ significantly from the complete mental health group ($b = -0.30$, $p = 0.09$). At Time 2, membership in the troubled group significantly predicted a 0.74 unit decrease in cognitive engagement ($p < 0.0001$). The symptomatic but content ($b = -0.23$, $p = 0.25$) and vulnerable ($b = -0.37$, $p = 0.06$) groups did not differ significantly from the complete mental health group. At Time 3, the troubled ($b = -0.71$, $p < 0.0001$) and vulnerable ($b = -0.73$, $p = 0.001$) groups differed significantly from the complete mental health group. The symptomatic but content group did not differ significantly ($b = -0.22$, $p = 0.30$).

Sensitivity Analyses Conducted to Explore Effects of Different Cut Scores Used to Establish Group Membership

Results of sensitivity analyses are reported in Supplemental Tables A–D. Regarding Question 1, the proportion of students classified into a given group changed some in the expected directions when slightly more lax or conservative cut scores ($T \geq 62$ or 66, respectively) were used to define elevated psychopathology. Supplemental Table A presents the distribution of students within a DFM at each time point as yielded from use of these alternate cut scores. Regardless of which cut scores were used, trends in the stability of students' mental health status remained the same; from Time 2 to Time 3, there were reductions in the percent of students with complete mental health and increases in the percent of troubled students (see Supplemental Table B). Regarding Question 2, change in mental health status was most commonly associated with changes in both psychopathology and SWB when using cut scores of $T \geq 62$ and $T \geq 66$, identical to the findings with the original cut score, although the dominance of this change type was less pronounced when alternate cut scores were used (see Supplemental Table C).

Regarding Question 3, findings of significant relationships ($p < 0.01$) between initial mental health status and later academic outcomes remained the same for 93.9% (62

Table 4 Two-level hierarchical linear model results

Model	Parameter	*b*	*SE*	*p*	Fit Indices	
					AIC	BIC
Time 2 GPA	*Fixed effects*				549.5	550.9
	Intercept	3.51	.09	< .0001		
	ACE Intervention	.005	.12	.97		
	Troubled	−.08	.08	.31		
	Symptomatic but content	.07	.10	.52		
	Vulnerable	−.16	.10	.12		
	Variance estimates					
	Intercept (school program)	.04	.02	.03		
	Residual	.28	.02	< .0001		
Time 3 GPA	*Fixed effects*				555.4	556.8
	Intercept	3.55	.07	< .0001		
	ACE Intervention	−.06	.09	.51		
	Troubled	−.17	.08	.04*		
	Symptomatic but content	.07	.11	.52		
	Vulnerable	−.32	.11	.003**		
	Variance estimates					
	Intercept (school program)	.01	.01	.12		
	Residual	.30	.02	< .0001		
Time 1 behavioral engagement	*Fixed effects*				358.7	359.4
	Intercept	3.52	.04	< .0001		
	ACE Intervention	.04	.05	.39		
	Troubled	−.26	.06	< .0001***		
	Symptomatic but content	−.06	.08	.46		
	Vulnerable	−.26	.08	.001**		
	Variance estimates					
	Intercept (school program)	0	–	–		
	Residual	.17	.01	< .0001		
Time 2 behavioral engagement	*Fixed effects*				443.2	443.9
	Intercept	3.37	.05	< .0001		
	ACE Intervention	.14	.05	.009**		
	Troubled	−.28	.07	< .0001***		
	Symptomatic but content	−.03	.09	.81		
	Vulnerable	−.19	.09	.04*		
	Variance estimates					
	Intercept (school program)	0	–	–		
	Residual	.22	.02	< .0001		
Time 3 behavioral engagement	*Fixed effects*				504.1	504.8
	Intercept	3.27	.05	< .0001		
	ACE Intervention	.14	.06	.02*		
	Troubled	−.20	.08	.008**		
	Symptomatic but content	−.01	.10	.89		
	Vulnerable	−.15	.10	.13		
	Variance estimates					
	Intercept (school program)	0	–	–		
	Residual	.26	.02	< .0001		

Table 4 (continued)

Model	Parameter	*b*	*SE*	*p*	Fit Indices AIC	BIC
Time 1 affective engagement	*Fixed effects*				325.5	326.2
	Intercept	3.06	.04	< .0001		
	ACE Intervention	.09	.04	.048*		
	Troubled	−.52	.06	< .0001***		
	Symptomatic but content	−.24	.07	.001**		
	Vulnerable	−.45	.07	< .0001***		
	Variance estimates					
	Intercept (school program)	0	–	–		
	Residual	.15	.01	< .0001		
Time 2 affective engagement	*Fixed effects*				347.6	349.0
	Intercept	2.90	.04	< .0001		
	ACE Intervention	.22	.05	.002**		
	Troubled	−.37	.06	< .0001***		
	Symptomatic but content	−.08	.08	.32		
	Vulnerable	−.35	.08	< .0001***		
	Variance estimates					
	Intercept (school program)	.003	.004	.21		
	Residual	.16	.01	< .0001		
Time 3 affective engagement	*Fixed effects*				434.7	436.1
	Intercept	2.83	.06	< .0001		
	ACE Intervention	.16	.08	.07		
	Troubled	−.34	.07	< .0001***		
	Symptomatic but content	−.03	.09	.71		
	Vulnerable	−.24	.09	.006**		
	Variance estimates					
	Intercept (school program)	.02	.01	.10		
	Residual	.20	.02	< .0001		
Time 1 cognitive engagement	*Fixed effects*				869.7	870.4
	Intercept	5.68	.09	< .0001		
	ACE Intervention	.18	.10	.08		
	Troubled	−.74	.13	< .0001***		
	Symptomatic but content	−.30	.17	.09		
	Vulnerable	−.59	.17	.001**		
	Variance estimates					
	Intercept (school program)	0	–	–		
	Residual	.81	.06	< .0001		
Time 2 cognitive engagement	*Fixed effects*				959.7	961.2
	Intercept	5.43	.10	< .0001		
	ACE Intervention	.25	.12	.03*		
	Troubled	−.74	.15	< .0001***		
	Symptomatic but content	−.23	.20	.25		
	Vulnerable	−.37	.20	.06		
	Variance estimates					
	Intercept (school program)	.001	.02	.48		
	Residual	1.06	.09	< .0001		

Table 4 (continued)

Model	Parameter	*b*	*SE*	*p*	Fit Indices AIC	BIC
Time 3 cognitive engagement	*Fixed effects*				994.1	994.8
	Intercept	5.42	.11	< .0001		
	ACE Intervention	.08	.12	.51		
	Troubled	-.71	.16	< .0001***		
	Symptomatic but content	-.22	.21	.30		
	Vulnerable	-.73	.21	.001**		
	Variance estimates					
	Intercept (School Program)	0	–	–		
	Residual	1.18	.09	< .0001		

AIC Akaike information criterion, *BIC* Bayesian information criterion

*$p < .05$; **$p < .01$; ***$p < .0001$

of 66 tests) of the primary results (11 outcomes X 2 alternate classifications X 3 groups compared to the complete mental health group). Supplemental Table D presents the parameter estimates from the two-level hierarchical models for the predictors of primary interest, specifically the effect of the troubled, symptomatic but content, and vulnerable groups in relation to the complete mental health group in predicting each academic outcome at each time point. Regarding the four exceptions, a cut score of $T \geq 62$ yielded two effects that were no longer significant: (a) The symptomatic but content group did not differ significantly from the complete mental health group on Time 1 affective engagement ($p = 0.28$) and (b) the vulnerable group did not differ significantly from the complete mental health group on Time 3 affective engagement ($p = 0.015$). A cut score of $T \geq 66$ yielded one additional statistically significant result: The vulnerable group had lower behavioral engagement at Time 2 than the complete mental health group; and one effect was no longer significant: The troubled group did not differ significantly from the complete mental health group on Time 3 behavioral engagement ($p = 0.03$). Taken together, findings from these sensitivity analyses indicate that having vulnerable mental health at the start of 9th grade predicted lower GPA in 10th grade and that vulnerable and troubled students experienced diminished student engagement throughout 9th and 10th grade, associations that were largely robust across a variety of cut scores used to identify elevated psychopathology and low SWB.

Discussion

The first aim of this study was to determine the stability of mental health status for high school students enrolled in accelerated curricula, when mental health status was defined as a particular quadrant of a dual-factor model. The majority of students fell in the complete mental health group at all three time points, followed by the troubled group. Both groups changed significantly from Time 2 to Time 3, with a decrease in students with complete mental health and an increase in students considered troubled. Across analyses with a variety of cut scores, about half of the participants maintained the same mental health status for all three time points, with the other half most frequently shifting in or out of the complete mental health group. These findings support research indicating that mental health status is largely stable across two time points (Kelly et al., 2012; McMahan, 2012; Xiong et al., 2017), yet also suggest that the same level of stability is not maintained across additional time points.

The second aim of the study was to determine whether changes in students' mental health status were due to changes in psychopathology, SWB, or both. Students who changed mental health status at least once most frequently demonstrated (a) a decrease in SWB, (b) an increase in psychopathology, (c) a decrease in psychopathology, or (d) a simultaneous decrease in SWB and increase in psychopathology. Thus, students who changed mental health status tended to deteriorate on one or both dimensions of mental health, with the exception of the smaller percentage that transitioned from the symptomatic but content to the complete mental health group. Further analyses indicated that the majority of students demonstrated concurrent changes in both dimensions. These findings align with previous research establishing psychopathology and SWB as correlated but distinct variables (Greenspoon & Saklofske, 2001; Suldo & Huebner, 2004), meaning that it is possible for both variables to deteriorate or for only one variable to deteriorate. Additionally, these findings support prior research demonstrating declines in components of SWB as youth age (Antaramian & Huebner, 2009; Cavallo et al., 2015;

Goldbeck et al., 2007; Suldo & Shaunessy-Dedrick, 2013a, 2013b; Waters et al., 2019).

The third aim of the study was to examine the relationship between students' mental health status at the start of 9th grade and academic outcomes over time. Regarding academic performance, students in the vulnerable group experienced delayed negative effects on GPA, supporting previous research indicating that GPA declines faster for youth with low SWB despite low levels of psychopathology (Lyons et al., 2013). One possible explanation for this delayed effect is the broaden-and-build theory of positive emotions, which suggests that experiencing positive emotions helps broaden an individual's outlook and build their abilities (Fredrickson, 2001). Low SWB, defined in part by a relatively low frequency of positive emotional experiences, distinguishes students in the vulnerable group from their peers with complete mental health. Thus, SWB may not relate to students' immediate GPA but may lead to increased academic performance as students strengthen their creativity, problem-solving, and academic skills over time. The low frequency of positive emotions experienced by students in the vulnerable group may have suppressed the cultivation of such personal competencies that help students thrive academically. Students in the symptomatic but content group did not experience the same decreases in GPA, suggesting that low SWB had a greater effect on later GPA than elevated psychopathology. This finding aligns with research indicating that SWB positively predicts later GPA (Suldo et al., 2011).

The current study identified a trend ($p = 0.04$) for students in the troubled group to experience significant negative impacts on GPA the following school year, when compared to youth with complete mental health. This relationship was not statistically significant when a conversative alpha was applied, but the direction of the association is in line with prior research linking high levels of psychopathology to poorer academic performance (Suldo et al., 2011, 2016). Due to a historical focus on negative indicators of mental health (Seligman & Csikszentmihalyi, 2000), it is possible that youth with elevated psychopathology are more likely to receive services than youth with low SWB. Thus, troubled youth may not display as steep of a decline in academic performance as that observed in vulnerable youth. Another explanation for the relatively weak association between a troubled mental health status and later academic performance relates to the fact that youth in the current study tended to report elevated internalizing symptoms (approximately 81%–86% of youth across time) rather than externalizing or comorbid symptoms, as previous research has demonstrated a stronger relationship between externalizing symptoms and GPA than internalizing symptoms and GPA (Suldo et al., 2011).

In terms of student engagement, membership in the troubled group at the beginning of 9th grade generally predicted lower behavioral, affective, and cognitive engagement over time (i.e., concurrently, at the end of 9th grade, and at the end of 10th grade) when compared to students with complete mental health. Given that previous research links both SWB and psychopathology to student engagement (Lyons et al., 2013; Suldo et al., 2016), it is not surprising that the troubled group—which reflects poor mental health on both dimensions—demonstrated lower engagement compared to the complete mental health group. Membership in the vulnerable group at the start of 9th grade consistently predicted concurrent lower student engagement, as well as diminished affective engagement later in 9th and 10th grade, diminished cognitive engagement in 10th grade, and a trend ($p = 0.04$) for diminished behavioral engagement at the end of 9th grade. Conversely, membership in the symptomatic but content group was related only to concurrent (Time 1) affective engagement, and not predictive of later cognitive, behavioral, or affective forms of student engagement. Taken together, findings suggest low SWB as a risk factor for worse student engagement, whether coupled with high psychopathology (i.e., the troubled mental health group) or not (i.e., the vulnerable group). Freshmen with elevated psychopathology at the start of the school year did not go on to experience subsequent low levels in student engagement when the protective factor of high SWB was present (i.e., the symptomatic but content group).

Limitations and Future Directions

Several limitations to the current study should be noted. First, the study utilized archival data from a larger project; approximately 64% of the sample participated in an intervention that built students' school engagement and use of effective coping styles. Intervention group was controlled for in all multilevel models. Second, some subgroups of students (e.g., troubled and vulnerable youth) left the study at significantly higher rates than others. Attrition most frequently occurred at Time 3, when another round of consent was required for continued participation. There was differential participation at the school level, with few returning students from 2 of the 14 schools. Additional attrition was due to students withdrawing from AP or IBD courses or moving out of the districts. Due to the attrition, the sample size was smaller at Time 3 of data collection ($n = 328$), and this smaller sample size limits the precision of the analyses run. Third, the study relied on self-report data to assess psychopathology and SWB. As some youth may provide answers in a socially desirable manner, future research should consider including teacher, peer, or parent report of youth mental health. Finally, although cut scores are a useful method of classification for school settings, they may not fully convey the potential variations in high school students' mental health

status. It is also possible that changes in students' mental health status occurred less frequently than observed in the data due to measurement error, particularly when students' ratings fell near the cut scores at a given time point. In part to address imperfect classification accuracy, we conducted sensitivity analyses with alternate cut scores. Conclusions from these analyses using mental health groups formed with alternate cut scores largely mirrored findings obtained using the original cut scores.

Despite limitations, the results of the current study highlight several avenues for future research. Future studies on a DFM during middle adolescence might begin data collection during 7th or 8th grade to better understand how mental health trajectories change as students enter high school. Further, results of the current study indicate that vulnerable youth may be at higher risk for academic concerns than symptomatic but content youth. Future studies could directly compare additional academic outcomes for youth in these two groups. Additional research on the bidirectional relationship between academic outcomes and mental health is also warranted. For instance, research on developmental cascades indicates that early forms of psychopathology negatively impact adolescents' academic outcomes, which in turn predict greater symptomology (Moilanen et al., 2010; Okano et al., 2020; Wigelsworth et al., 2017). Future studies also could examine how change in mental health status over time predicts academic outcomes. Lastly, we focused on the classification of students into the four quadrants defined by a dual-factor model of mental health and examined change in the membership of those four groups over time. Future research could conceptualize mental health as positioned on continuous mental health variables or as membership in latent classes, which would lead to the use of different analytic methods to examine longitudinal change in mental health.

Implications for School-Based Services

The results of this study inform school-based delivery of mental health services in three key ways. First, the findings support research indicating that youth in accelerated coursework may experience increases in psychopathology, declines in SWB, or—most likely—both. Thus, in addition to screening for elevated psychopathology (e.g., using the Behavioral and Emotional Screening System [BESS]; Reynolds & Kamphuas, 2015), schools should monitor students in AP or IBD coursework for low levels of well-being. The measures used in the current study (SLSS, PANAS-C-10) are free tools that assess components of well-being (life satisfaction and affect, respectively). The Social Emotional Health Survey-Secondary (SEHS-S; Furlong et al., 2014) is another measure that may be used to assess well-being in high school students. Second, given that students appear to be particularly at risk for declining mental health between the end of 9th grade and the end of 10th grade, early high school is a crucial time to provide mental health services to youth in accelerated curricula. Conceptualizing mental health within a DFM, as done in the current study, can help practitioners align these services with multi-tiered systems of supports (e.g., Tier 1 supports for all students, Tier 2 supports for vulnerable or symptomatic but content youth, Tier 3 supports for troubled youth; see Doll et al., 2021, for more discussion). Finally, SWB at the start of 9th grade appears important in relation to academic outcomes for students in accelerated coursework. High school leaders should consider prioritizing school mental health programs and practices that cultivate positive emotions (Suldo et al., 2021), and refer youth with low SWB for preventative services to reduce risk for later academic difficulties.

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Data Availability The data used in this study are part of an ongoing intervention study and not yet publicly available.

Declarations

Conflict of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

Ethics Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee (University of South Florida, IRB Number: Pro00022787) and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Consent to Participate Written consent was obtained from the parents of all participants. Written assent was obtained from all participating youth (high school students).

Consent to Publish Parents of all participants signed informed consent regarding publishing student data. Participating youth signed informed assent indicating their permission for publishing of findings from the study that included their data.

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