2015

Examining the Prevalence Rates, Demographic Differences, and Concurrent Validity Associated with a Universal Bidimensional Mental Health Screener for Youth in Schools

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EXAMINING THE PREVALENCE RATES, DEMOGRAPHIC DIFFERENCES, AND CONCURRENT VALIDITY ASSOCIATED WITH A UNIVERSAL BIDIMENSIONAL MENTAL HEALTH SCREENER FOR YOUTH IN SCHOOLS

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Arts

in

The Department of Psychology

by
Sarah J. Bolognino
B.S., Le Moyne College, 2010
December 2015

TABLE OF CONTENTS

ABSTRACT

When using a bidimensional mental health (BDMH) model, psychological distress *and* wellbeing are measured. This study used a mental health screening measure, with equal number of items measuring each mental health dimension (i.e., wellbeing and distress) to classify students into one of four possible mental health groups: *mentally healthy* (MH), *mentally unhealthy* (MU), *symptomatic but content* (SBC), and *asymptomatic but discontent* (ABD). First, prevalence rates for each group in a sample of youth from the 2009–10 Health Behavior in School-aged Children Survey in the United States ($N = 6{,}345$) were explored; about a quarter of the population experienced mixed mental health (i.e., SBC or ABD). The second purpose was to investigate how demographic variables (e.g., gender, ethnicity) influenced a student's BDMH; these variables did not have a practically meaningful relationship to BDMH. The third purpose was to investigate the effect of BDMH classification (i.e., MH, MU, SBC, or ABD) on relevant student behavior variables (i.e., school performance perceptions, class climate, bullying victimization and perpetration, family support, life satisfaction, somatic symptoms, alcohol, cigarette, and marijuana use). Results indicated that MH students experienced the most advantageous, and MU students the most deleterious, concurrent outcomes. However, ABD students (not identified by a traditional screener) experienced concurrent outcomes worse than or similar to their MU peers. Taken together, the results suggest that measuring wellbeing has value-added in differentiating students with varying levels of risk, and identifying students with potential need for intervention. Implications of these results and considerations regarding measurement of psychological wellbeing in mental health screening procedures in schools are discussed.

LITERATURE REVIEW

Youth mental health is of paramount importance. According to the National Institute of Mental Health, over 46% of youth ages 13-18 experience a mental illness, and over 21% of youth in the same age range experience or have experienced a severe mental illness (Merikangas et al., 2010). Youth suffering from mental illness are at risk for negative proximal outcomes, including poor school attendance and educational achievement, as well as more distal negative outcomes, including incarceration or homelessness (Hogan, 2008). However, at best only a quarter of students with a diagnosable psychological disorder receive psychological services outside of school (Hoagwood & Johnson, 2003), highlighting the need for school-based mental health prevention and intervention efforts. To facilitate this, population-based mental health screening tools are needed, to identify students who would otherwise go unidentified and untreated (Dowdy, Ritchey, & Kamphaus, 2010).

Schoolwide Mental Health Screening

Population-based mental health screenings in schools can be used for a series of purposes. Their results can gauge the prevalence rates of certain problems within the population, and thus be used to identify and inform which prevention and intervention efforts the school or district should invest time and resources into to meet the students' needs at the universal level. Additionally, a universal screening tool can be used to identify students who need to be assessed more closely to determine if a more intense level of intervention is appropriate. Also, they can be used over time to track cohort trends and perhaps gauge effectiveness of schoolwide programming such as a universal social-emotional learning curriculum. Lastly, if sensitive to change, these measures may also have utility at a targeted level within the response to intervention framework as a progress monitoring tool (Dowdy et al., 2010).

There are several methods for obtaining population-based mental health screening data, including sociometric ratings and behavior rating scales. Using sociometric ratings, teachers or student informants report on the interpersonal relationships within a specific social group. One way to do this might be to have informants rate which student is most likely to "get into trouble," "play alone at recess," or "get along with others" (Coie, Dodge, & Coppotelli, 1982). While this may be expedient, it is not a comprehensive universal method, as data is not collected for every student. Brief behavior rating scales, in contrast, can be used as screening measures that identify the risk level of each individual student. These measures may be self-report or informant-report. When students change classes frequently, such as in the case of older students, or students receiving differential instruction, self-report behavior rating scales have advantages over other methods as an initial step for identifying at risk students. Data can quickly be collected on each student using a self-report method if administering the measure to a class simultaneously. Additionally, this method, rather than using a sociometric or teacher-report method, does not require aggregating data across students or teachers (McConnell & Odom, 1986), which increases its feasibility for practitioners. For these reasons, this investigation explored the utility of a brief self-report behavior rating scale that might function as a universal screener.

It is recommended best practice to use universal mental health screeners within the context of a multiple-gating procedure. In this process, a universal screening measure may be used as a first step in identifying those possibly in need of intervention. The smaller subset of the population that is identified as "at risk" by the universal screener then enters the next "gate" of assessment, which is more time and resource intensive. As fewer students pass each progressive gate, more rigorous assessments are used. This process conserves resources by focusing the most intensive assessment on those at highest risk. Because the aim of universal screeners is to

identify every student who could possibly be at risk, standard scores of psychopathology or problem behavior that are 1 *SD* above the mean are used to indicate risk (Walker, Small, Severson, Seeley & Feil, 2014).

Conceptualizing Mental Health

While there is little debate that there is a need to assess mental health in schools using population-based screening tools, there is debate regarding how to best conceptualize and measure mental health functioning in youth, which, in turn, has implications for which instruments might be most useful for screening youth's mental health in schools. Traditionally, mental health has been conceptualized as a unidimensional construct (also called the "modal perspective"): with the presence of psychopathology indicating poor mental health on one end of the continuum, and absence of psychopathology indicating positive mental health on the other (Payton, 2009). Using this schema, a decrease in psychopathology equates to a simultaneous increase in positive mental health, and thus screening diagnostic labels refer to an individual's health using descriptors such as "not at risk," "on the radar," and "at risk." (Cook, Rasetshwane, Truelson, Grant, Dart, Collins, & Sprague, 2011; Dowdy, Furlong, Eklund, Saeki, & Ritchey, 2010). However, recent research has found that using a bidimensional (also called "dual-factor" or "two-continua" or "complete") mental health model may be more useful than the unidimensional model for identifying students with greater levels of risk (Eklund, Dowdy, Jones, & Furlong, 2011; Renshaw & Cohen, 2014). The bidimensional mental health (BDMH) model conceptualizes mental health along two distinct-yet-related dimensions, which allows for the possibility of higher or lower levels of negative mental health (e.g., measuring internalizing or externalizing symptoms) to combine with higher or lower levels of positive mental health (e.g., measuring socially desirable emotions, cognitions, or behaviors). Each dimension can be

measured by a single construct (e.g., life satisfaction and depression) or by meta-constructs (e.g., covitality and comorbidity; Eklund, et al., 2011).

Most investigations of the BDMH model thus far have used a categorical approach, wherein four possible mental health outcome groups were indicated. These groups have been labeled differently, depending on the investigation: individuals with average-to-high levels of positive mental health and low-to-average levels of negative mental health have been called *completely mentally healthy*, *well-adjusted*, or *mentally healthy*; individuals with low positive mental health and low-to-average negative mental health have been called *vulnerable*, *at-risk*, or *asymptomatic yet discontent*; individuals with average-to-high levels of positive mental health and high levels of negative mental health have been called *symptomatic but content* or *ambivalent*; and lastly, individuals with low levels of positive mental health and high levels of negative mental health have been called *troubled*, *distressed*, or *mentally unhealthy* (Eklund et al., 2011; Suldo & Shaffer, 2008). In this investigation, the terms *mentally healthy* (MH), *mentally unhealthy* (MU), *symptomatic but content* (SBC), and *asymptomatic but discontent* (ABD) are used to represent these four groups. At present there is no common decision rule for delineating between "average" and "at risk." When measuring psychopathology, some investigations used 1 *SD* as the cut off (Eklund, et al., 2011; Suldo & Shaffer, 2008) while another used 2 *SD* (Renshaw & Cohen, 2014). When measuring wellbeing, one investigation used a cut off score of .76 SD (Suldo & Shaffer, 2008) and others used criterion-referenced cut off scores (Eklund, et al., 2011; Renshaw & Cohen, 2014). For the purposes of the present study, distress levels greater 1 *SD* were considered "at risk" and wellbeing levels below -1 *SD* were considered "at risk."

To date, research investigating the BDMH model has shown that measuring wellbeing in addition to distress is valuable in identifying students at higher risk. For example, a unidimensional screener measuring only distress would identify both MU and SBC students as being at equal risk, because wellbeing is not measured. However, when wellbeing is measured, these students can be differentiated into two distinct groups based on their level of wellbeing. This is useful because previous studies have shown that MU students fare significantly worse than comparison groups, including SBC students who share their elevated distress symptoms (i.e., MU students experience more social problems, worse health perceptions/physical health, greater somatic symptoms, less gratitude, worse interpersonal connections including less support from parents, classmates, and teachers than SBC students; Eklund et al., 2011, Renshaw & Cohen, 2014, Suldo & Shaffer, 2008). This distinction could be practically useful to mental health professionals in schools, as they could easily identify students of greatest risk and focus their time and resources on providing follow up assessment to those students first.

Another benefit of measuring wellbeing in addition to distress is the identification of ABD students. These students, who experience low to average distress paired with low wellness, have significant disadvantages compared to MH students (i.e., reading ability/academic achievement, school absences, academic self-perception, motivation, self regulation, value of school, school problems, social support/interpersonal connections, health perceptions, hope, and gratitude; Eklund et al., 2011, Renshaw & Cohen, 2014, Suldo & Shaffer, 2008). This supports the notion that the absence of distress does not equate to the presence of wellbeing. Furthermore, when comparing SBC students and ABD students, results are mixed, as some concurrent outcomes are more favorable for SBC students (i.e., school absences, social support, interpersonal connectedness, physical health) and others more favorable for ABD students (i.e.,

locus of control, and attention). For many concurrent outcomes for ABD and SBC students, the level of risk was indistinguishable (i.e., social problems, GPA, reading and math ability, attitude towards school, hyperactivity, alcohol use, hope, grit, gratitude, bodily pain, and general health perceptions; Eklund et al., 2011, Renshaw & Cohen, 2014, Suldo & Shaffer, 2008). This suggests that the mental health of SBC and ABD students is better than MU students, but worse than MH students. Considering the similarities between their concurrent outcomes, given the current research, ABD and SBC students may be considered at the same level of risk.

The general trend of findings in the previous research is captured in this heuristic:

$MH > SBC \geq ABD > MU$ for positive concurrent outcomes

$MH < SBC \leq ABD < MU$ for negative concurrent outcomes

Thus far, studies of BDMH have used omnibus distress measures (e.g., BASC-2) and either single or multi-construct wellbeing measures (e.g., Quality of Life Interview, Brief Version; QOL-BV) that amount to 100 or more items in total. These findings have not been generalized to screening length measures. Notably, in each of the previous studies psychological wellbeing was measured less comprehensively than psychological distress. And psychological wellbeing was measured by a simple measure of life satisfaction or some derivative. This investigation will represent each dimension with the same number of items.

These results, if replicable in a screening-length measure, might have implications for mental health screenings in schools. If a BDMH screener yields a similar pattern of results to the previous studies that used longer diagnostic measures, then mental health professionals working at the schoolwide or Tier 1 level would be able to identify students with the highest level of risk (MU), as well as students at some risk (ABD, and SBC), and students considered not at risk

(MH). These findings could then be used to provide differential priority in follow up assessment and services.

Purposes of the Present Study

The overarching purpose of this study was to explore whether the findings from previous studies investigating the BDMH model using lengthy behavior rating scales would generalize to a brief self-report behavior rating scale—the Psychological Wellbeing and Distress Screener (PWDS; Renshaw & Bolognino, 2015)—that is intended to function as a BDMH universal screener in schools. Beyond being the first brief measure of BDMH, the PWDS is also the first balanced and psychometrically validated measure of BDMH, and it is comprised of an equal number of items representing each dimension that were identified through factor analyses. Specifically, this study investigated three questions regarding results derived from the PWDS:

1. What are the prevalence rates of the four mental health groups within the BDMH schema (i.e., MU, MH, SBC, and ABD)?
2. Is BDMH group associated with students' demographic characteristics?
3. Do students in BDMH groups show differential patterns of functioning across concurrent outcome variables relevant to student success?

If prevalence rates were similar to ranges in previous studies, that suggests the PWDS and lengthier measures used in previous studies classify students similarly. Based on previous studies, it was hypothesized that the prevalence rate for the MH group would be the largest (57-78%), ABD group will be the second largest (9-19%), MU will be the second smallest, (9-17%), and SBC will be the smallest category (4-13%; Eklund et al., 2011, Renshaw & Cohen, 2014, Suldo & Shaffer, 2008).

Significant BDMH group differences with regard to demographic variables with meaningful effect sizes would suggest either that the measure is biased, or there are actual group differences in regards to BDMH functioning. Because the kinds of analyses needed to determine if a measure is biased across demographic groups is beyond the scope of this study, results are interpreted using the more straightforward suggestion of actual group differences. Only one previous study explored demographic differences and found no significant BDMH group differences in gender or grade. There were, however, significant group differences in race/ethnicity and socio-economic status (SES). American Indians were overrepresented in the MU group. Students from lower SES background were overrepresented in the MU group, and underrepresented in the MH group. Students from higher SES background were overrepresented in the MH category and underrepresented in the MU category (Suldo & Shaffer, 2008). It was hypothesized a similar pattern of evidence would be found for the aforementioned demographic variables in the present study. The current study investigated the potential effect of three additional demographics: having a disability/medical condition, the students' broad area of residence, and census division. As these variables were yet to be investigated in relation to BDMH classifications, the null hypothesis was assumed.

Given the previous research indicating that students in different BDMH groups have differential patterns of functioning across other concurrent outcomes that are relevant to student success (Eklund et al., 2011, Renshaw & Cohen, 2014, Suldo & Shaffer, 2008), it was hypothesized that similar patterns of differential functioning would be observed for the BDMH classifications derived from the PWDS. Specifically, it was hypothesized that across several concurrent outcomes (i.e., school performance perceptions, class climate, bullying victimization

and perpetration, family relationships, life satisfaction, somatic complaints, alcohol, cigarette, and marijuana use) the same general heuristic of findings would apply:

$MH > SBC \geq ABD > MU$ for positive concurrent outcomes

$MH < SBC \leq ABD < MU$ for negative concurrent outcomes

METHOD

Participants and Sampling

Participants were 5,949 students in grades 5–10 enrolled in public, private, or Catholic schools in the United States who completed the 2009–2010 Health Behavior of School-Aged Children (HBSC) survey (Iannotti, 2013). Participants in this investigation were a random split-half of the original HBSC sample, which was used in an earlier study to develop the PWDS screener (Renshaw & Bolognino, 2015). The original half consisted of 6,352 cases; however, the final number after missing data was managed was 5,949 (see the analysis section below for details on the procedure). The final sample in the present study consisted of 3,002 males (50.5%), 2,190 students living in suburban areas (36.8%), and 2,906 students identifying as White (48.8%). See Table 1 for a full disclosure of available participant demographics.

HBSC participants were selected using a sophisticated multi-phase sampling methodology. First, public school districts were grouped into sampling units and then stratified into Census Divisions based on their population characteristics. Then private and Catholic schools were assigned to the appropriate sampling unit by location. There were 1,302 sampling units created. Next, schools were selected from the sampling units for participation. Out of the 475 schools that met eligibility criteria for participation, 314 completed the HBSC. Finally, participating schools were assigned to sample students in one grade level (i.e. five to 10) and usually two classrooms (with a range of one to four classrooms) were selected, sampling each student in the class. About 98% of students within participating schools consented but, due to absences, data was collected for just over 90% of the consenting students. This yielded an overall response rate of 86%. Refer to 2009–10 HBSC codebook for more information about the survey and the procedures used for data collection (Iannotti, 2013).

Table 1
Sample Demographics

Variable	Frequency	Percent (%)
Gender		
Male	3002	50.5
Female	2946	49.5
Grade in School		
5	759	12.8
6	958	16.1
7	1079	18.1
8	1214	20.4
9	1011	17.0
10	928	15.6
Race		
Black/African American	964	16.2
White	2906	50.9
Asian	203	3.4
American Indian/Alaska Native	99	1.7
Native Hawaiian/Other Pacific Islander	53	.9
Two or more races	408	6.9
Hispanic	1073	18.8
Broad Residence Classification		
Unclassified	452	7.6
Urban	1783	30.0
Suburban	2190	36.8
Rural	1524	25.6

Health Behavior in School-Aged Children Survey (HBSC)

The Health Behavior in School-Aged Children (HBSC) survey is an international investigation that measures health-related behaviors in youth. Sponsored by the World Health Organization (WHO), this survey is conducted every four years by researchers in participating countries, with 43 nations participating in the 2009–10 cycle. The present study utilized data from the United States in the 2009–10 HBSC cycle. This survey, which is intended to advance health professionals' understanding of youths' habits and functioning as well as inform decisions

about youth health promotion and education broadly, is comprised of a student self-report and administrator-report. The present study dealt exclusively with the student self-report data.

The HBSC student self-report (HBSC-S) was a survey comprised of 85 potential items and took about 45 minutes to complete. Items in the survey provided information about a wide variety of student variables, perceptions, and attitudes. Information was collected regarding demographic and personal background information (e.g. gender, socioeconomic status), social/environmental variables (e.g. peer relationships, perceptions of school environment), health behaviors and outcomes (e.g. exercise, BMI), and risk behaviors (e.g. bullying, substance use). There were three slightly different versions of the HBSC student self-report survey administered in order to be responsive to developmental differences (i.e., the $5^{th}/6^{th}$ grade, $7^{th}/8^{th}/9^{th}$ grade, and 10^{th} grade).

Data from the surveys are publically available and have been adjusted from their original form to ensure consistency and confidentiality. Data cleaning included indicating "not applicable" on items that the student was not asked to complete due to grade, or gender. Data cleaning also included checking for consistency in responses. This means if a student answered "no" to an initial question (e.g., rejected bullying another student), but subsequently answered the follow-up question (e.g., endorsed cyber bullying in particular), the answer to the main question was recoded as "yes". Identifying information including date of survey administration, date of birth, height, weight, and number of students eligible for free and reduced lunch were removed, and the information was recoded in a non-specific categorized groups. Additionally, several items were reverse-coded for ease of interpretation.

Psychological Wellbeing and Distress Screener (PWDS)

The PWDS was developed from items included within the HBSC student self-report form and is intended to be used as brief measure of BDMH (Renshaw & Bolognino, 2015). The overall measure is comprised of ten items, five items measuring psychological wellbeing and five measuring psychological distress. The psychological wellbeing items use the stem, *"Thinking about last week…"* (e.g., *"…have you felt full of energy?"*). Response options are relative frequency-based and include: 1 = *never*, 2 = *seldom*, 3 = *quite often*, 4 = *very often*, and 5 = *always*. Two items measuring psychological distress use a similar stem and scaling, while three use the following stem: "*In the past 6 months how often have you had the following…?"* (e.g., *"…feeling low"*). Response options for this stem are also relative frequency-based: 1 = *about every day*, 2 = *more than once a week*, 3 = *about every week*, 4 = *about every month*, 5 = *rarely or never* (see Table 2 for all items and Table 3 for scoring details).

Table 2
Items for the Psychological Wellbeing and Distress Screener

Item	Response Options
Wellbeing	
Thinking about last week have you felt fit and well?	A
Thinking about last week have you felt full of energy?	A
Thinking about last week have you had fun with friends?	A
Thinking about last week have you got on well at school?	A
Thinking about last week have you been able to pay attention?	A
Distress	
In the past 6 months how often have you had the following: feeling low	B
In the past 6 months how often have you had the following: irritability or bad temper	B
In the past 6 months how often have you had the following: feeling nervous	B
Thinking about last week have you felt sad?	C
Thinking about last week have you felt lonely?	C

Note. A. (1) never, (2) seldom, (3) quite often, (4) very often, (5) always; B. (1) about every day, (2) more than once a week, (3) about every week, (4) about every month, (5) rarely or never; C. (1) always, (2) very often, (3) quite often, (4) seldom, (5) never

Table 3
Scoring Guidelines for the PWDS

	Mentally Healthy	Symptomatic But Content	Asymptomatic But Discontent	Mentally Unhealthy
PWS Score	≥16 PWS	≥16 PWS	<16 PWS	<16 PWS
PDS Score	<17 PDS	≥17 PDS	<17 PDS	≥17 PDS

Note. Less than 16 on PWS = at risk for low wellbeing; greater than 17 on PDS = at risk for high distress

Exploratory and confirmatory factor analyses demonstrated that the PWDS is best conceptualized as measuring two distinct constructs (i.e., wellbeing and distress) that are strongly negatively correlated (r = -.55). Exploratory factor loadings for the wellbeing scale range from .43 to .86, while confirmatory factor loadings range from .52 to .73. Exploratory factor loadings for the distress scale range from .50 to .71, while the confirmatory factor loadings range from .56 to .69. Internal consistency has also been shown to be adequate for both subscales (exploratory: α = .75 and .77, confirmatory: H = .77 and .79; Renshaw & Bolognino, 2015). BDMH classification, as derived from students' wellbeing and distress composite scores from the PWDS, served as the primary grouping variable of interest in the present study.

Teachers who participated in the second phase of the study, the interview component, were randomly selected and represented 22.5% of the overall sample (n = 9). All teachers were female and taught Pre-K (11%; n = 1), first grade (11%; n = 1), second grade (33%; n = 3), third grade (11%; n = 1), fourth grade (22%; n = 2), and special education (11%; n = 1). All but one of the interview participants worked in one of the four elementary schools and 88% identified as White, Non-Hispanic (n = 8), so despite random sampling, teachers who consented to participate in the second phase may not have been completely representative of the overall sample.

Demographic Variables

Gender. The gender variable was measured by a single item on the HBSC-S, *"Are you a boy or a girl?"* Response options included 1 = *male* and 2 = *female*.

Grade. The grade variable was measured by a single item on the HBSC-S, *"What grade are you in?"* Response options ranged from 5 = *grade 5* to 10 = *grade 10*.

Race and ethnicity. The race and ethnicity variable was measured by a computed item on the HBSC-S that asks, *"What do you consider your race to be?"* Response options included 1 = *Black or African American*, 2 = *White*, 3 = *Asian*, 4 = *American Indian or Alaskan Native*, 5 = *Native Hawaiian or other Pacific Islander,* 6 = *two or more races*, and 7 = *Hispanic*. In the original item, students were allowed to mark all races they identify with. If more than one was selected, the answer was recoded as *two or more races*. These categories correspond to the United States Census categories.

Family affluence scale. The Family Affluence Scale measured the family affluence variable, which was a composite score on the HBSC of items used as a proxy measure for wealth. Scores were on a 10-point scale varying from 0 = *low* to 9 = *high*. Items that made up the composite include how well off the student believes his family is, how many vehicles the family owns, and number of family trips in the past year. A quartile split was used to transform this variable, to convey the following rudimentary approximation for socioeconomic status 1 = *low SES*, 2 = *middle cl*ass, 3 = *high SES*. The interquartile range from 1-3 was considered *middle class*.

Presence of a medical condition or disability. A single item on the HBSC-S measured the medical condition or disability variable, *"Do you have a long-term illness, disability, or*

medical condition (like diabetes, arthritis, asthma, allergy, ADHD, or cerebral palsy) that has been diagnosed by a doctor?" Response options included 1 = *yes* and 2 = *no*.

Broad residence classification. The broad residence classification, indicating where the student's school is located, was completed for the student by the HBSC research staff and included 0 = *unclassified*, 1 = *urban*, 2 = *suburban*, and 3 = *rural*.

Concurrent Validity Variables

School performance perceptions. A single item from the HBSC-S measured students' perception of their academic performance, *"In your opinion, what does your class teacher(s) think about your school performance compared to your classmates?"* Response options included 1 = *very good*, 2 = *good*, 3 = *average*, and 4 = *below average*.

Class climate. Students' perceptions of their class climate were measured by a composite of three items in the HBSC-S. These items were prefaced as follows: "Here are some statements about the students in your class(es). Please show how much you agree or disagree with each one." The three items that follow included: *"The students in my class(es) enjoy being together," "Most of the students in my class(es) are kind and helpful,"* and *"Other students accept me as I am."* Response options included 1 = *strongly agree*, 2 = *agree*, 3 = *neither agree nor disagree*, 4 = *disagree*, and 5 = *strongly disagree*.

Bullying victimization and perpetration. The following definition was given for bullying on the HBSC-S: "We say a student is being bullied when another student, or a group of students, say or do nasty or unpleasant things to him or her. It is also bullying when a student is teased repeatedly in a way he or she does not like or when they are deliberately left out of things. But it is not bullying when two students of about the same strength or power argue or fight. It is also not bullying when a student is teased in a friendly and playful way." Following this

definition, bullying victimization was measured using one item: *"How often have you been bullied at school in the past couple of months?"* Bullying victimization was also measured by one item: *"How often have you taken part in bullying another student(s) at school in the past couple of months?"* Response options for both items included: 1 = *I haven't bullied another student/been bullied at school the past couple of months*, 2 = *it has only happened once or twice*, 3 = *two or three times a month*, 4 = *about once a week*, or 5 = *several times a week*.

Family support. A single item in the HBSC-S measured the family support variable: *"In general, how satisfied are you with the relationships in your family?"* Response options were on a scale from 0 = *"We have very BAD relationships in our family,"* to 10 =*"We have very GOOD relationships in our family."*

Life satisfaction. A single item in the HBSC-S measured the life satisfaction variable: *"Here is a picture of a ladder. The top of the ladder '10' is the best possible life for you and '0' at the bottom is the worst possible life for you. In general, where on the ladder do you feel you stand at the moment?"* Response options were on a scale from 0 to 10.

Somatic symptoms. The somatic symptoms variable was measured by a composite of 5 items from the HBSC-S. The items were prefaced with the following stem: *"In the last 6 months, how often have you had the following?"* Specific items included headaches, stomachaches, backaches, difficulty sleeping, and feeling dizzy. Response options included 1 = *about everyday,* 2 = *more than once a week,* 3 = *about every week,* 4 = *about every month,* 5 = *rarely or never.*

Alcohol use. A single item from the HBSC-S measured the alcohol use variable: *"On how many occasions (if any) have you done the following things in the last 30 days? Drunk alcohol."* Response options included 1 = *never*, 2 = *once or twice*, 3 = *3–5 times*, 4 = *6–9 times*, 5 = *10–19 times,* 6 = *20–39 times,* 7 = *40 times or more.*

Cigarette use. A single item from the HBSC-S measured the cigarette use variable: *"On how many occasions (if any) have you done the following things in the last 30 days? Smoked cigarettes."* Response options included 1 = *never*, 2 = *once or twice*, 3 = *3−5 times,* 4 = *6−9 times*, 5 = *10−*19 *times*, 6 = *20−*39 *times*, 7 = *forty times or more*.

Marijuana use. The marijuana use variable was measured by a single item on the HBSC: *"Have you ever taken marijuana (pot, weed, hashish, joint) in the last 30 days?"* Response options included 1 = *never*, 2 = *once or twice*, 3 = *3−5 times*, 4 = *6−9 times*, 5 = *10−19 times*, 6 = *20−39 times*, 7 = *40 times or more*.

Data Analysis

Prior to conducting the primary data analysis, preliminary analyses were conducted to investigate patterns of missing data and the assumptions of the primary analyses were checked. Several variables were transformed to achieve or improve normality (see Table 4 for details).

Table 4
Normality of Concurrent Validity Variables

Variable	Skewness	Kurtosis	Acceptability
Original Variables			
School performance perceptions	.391	-.647	Normal
Class climate	.734	.793	Normal
Bullying victimization	2.325	4.768	Not normal
Bullying perpetration	2.573	7.058	Not normal
Family relationships	-1.241	.940	Normal
Life satisfaction	-.895	.734	Normal
Somatic symptoms	-1.059	.613	Normal
Alcohol use	3.249	10.787	Not normal
Cigarette use	4.225	17.450	Not normal
Marijuana use	5.512	31.467	Not normal

(Table 4 continued)

Variable	Skewness	Kurtosis	Acceptability
Transformed Variables			
Alcohol use	2.132	3.736	Not normal
Cigarette use	3.378	10.638	Not normal
Marijuana use	4.405	19.249	Not normal
Bullying victimization	1.599	1.375	Normal
Bullying perpetration	1.595	1.620	Normal

Next, preliminary analyses investigated the distribution of participants' composite scores for the wellbeing and distress composites of the PWDS, and participants were grouped into one of two mental health statuses for wellbeing (*low* = score < -1 *SD*, *average-to-high* = score > -1 *SD*) and distress (*low-to-average* = score < 1 *SD*, *high* = score > 1 *SD*) using standard deviation metrics common to testing and screening. Following, a BDMH group variable was created by combining the classifications resulting from the separate wellbeing and distress composites (i.e., MH = average-to-high wellbeing paired with low-to-average distress, MU = low wellbeing paired with high distress, SBC = average-to-high wellbeing paired with high distress, ABD = low wellbeing paired with low-to-average distress). Once these steps were completed, the primary data analysis began.

First, to determine the prevalence rates of the four mental health outcomes, descriptive statistics were calculated on the BDMH classification variable. Second, to examine the potential effects of demographic variables on BDMH classification rates, a form of multi-way frequency analysis, called loglinear analysis, was first used to determine if the nesting variable (census division) had an impact on the analysis. Census division was chosen as the nesting variable because other options (i.e., individual school and district) did not have had sufficient cases per sampling unit to allow results from the analyses to be interpreted. After it was determined that

census division did not significantly affect the results (see the Results section, below), a series of chi-square analyses were conducted using the BDMH classification variable and the various demographic variables. Cramer's *V* was the effect size of interest for each model and *z*-tests were conducted to compare column proportions to each other.

Finally, to investigate concurrent validity, several ANOVA were conducted using the BDMH classification variable as the grouping factor and the other concurrent outcome variables (i.e., school performance perceptions, class climate, bullying victimization and perpetration, family support, life satisfaction, somatic symptoms, alcohol use, cigarette use, and marijuana use) as the dependent variables. For each variable, the model was run three different ways in order to determine if accounting for the nested nature of the data was necessary. First, it was run as a standard ANOVA, ignoring the nested nature of the data; second, it was run with a random intercept for census division added to the model; third, it was run with random intercept and slope (census division and BDMH variability were added). Models were compared by examining the difference in -2 log-likelihood between subsequent models. If the difference met a critical threshold, the more complex model was significantly better. If the second model (with random intercept) was significantly better than the first, then the third model was tested (with random intercept and slope). The best fitting model was used and reported for each concurrent validity variable. Then planned comparisons were conducted and analyzed, using Hedge's *g* as an effect size, to investigate between-group differences to see if there were meaningful differences across concurrent outcomes for the specific BDMH groups.

RESULTS

Preliminary Analyses

Data cleaning

To guide the process for managing missing data, recommendations from Schlomer, Bauman, and Card (2010) were used. Of the participants in the original 6,345 case dataset, 1,322 of them (20.8%) were missing at least one response to the PWDS, used to create the BDMH groups, which was high enough to merit data management. There were 479 of 6,345 cases missing at least one item from the wellbeing composite of the PWDS (7.5%) and 675 of 6,345 cases missing at least one item from the distress composite of the PWDS (10.6%). In order to investigate the pattern of missing data for the purposes of generating BDMH classifications, a dummy variable was created in which "1" indicated a participant with missing data on at least one the PWDS items, and "2" indicated all 10 items of the PWDS were completed. Then separate ANOVAs were conducted for each concurrent validity variable, casting the dummy variable as the independent variable. The results of the missing data were small or negligible across the concurrent outcome variables (small effects for school performance perceptions, class climate, family support, life satisfaction; negligible effects for bullying victimization and perpetration, somatic symptoms, alcohol, cigarette, and marijuana use). While an option such as multiple imputations was more ideal for handling this pattern of missing data, due to software limitations the options were SPSS listwise deletion, pairwise deletion, or mean substitution. Participants who answered at least four of five items on each of the PWDS scales (i.e., wellbeing and distress) were included in the data analysis. Any missing data was replaced with the average response from the participant's endorsement of the other four items within the scale. This option, mean substitution, was chosen because it is the most conservative option. The bias of this option

is to reduce the variance of the variable, making significance more difficult to detect (Schlomer et al., 2010). However, with a large sample size and sufficient power, this issue was minimized. Following this procedure, the BDMH grouping variable was created using the method outlined above.

Normality checks for concurrent validity variables

When checking the normality of the concurrent outcome variables, skewness and kurtosis statistics suggested that several were not normally distributed (see Table 4). Criteria for determining relative normality were skewness and kurtosis values of |2|, which were recommended as conservative decision rules by Hancock & Mueller (2010). Thus, a log 10 transformation was used on all non-normally distributed variables (i.e., bullying victimization, bullying perpetration, alcohol use, cigarette use, and marijuana use). This transformation improved the normality of all non-normally distributed variables and brought the bullying items within normal distribution limits. The transformed variables were used for those five variables in phase three analyses.

Assumption checks

In phase two, for the log linear analysis and chi-squared analysis, assumptions of cell independence and frequency were checked and met (meaning participants chose only one response for each item and at least one participant endorsed each response option). In phase three, for the ANOVAs, assumptions of independence of observations across groups, homogeneity of variance, and normality of the response variable were checked. Results of normality are listed in Table 4. The other assumptions were fully met.

Primary Analyses

Prevalence rates of BDMH groups

Prevalence rates for BDMH groups derived from the PWDS are presented in Table 5. MH was the most prevalent group (n = 4233, 71.2%), followed by SBC (n = 783, 13.2%), ABD (n = 628, 10.6%), and MU (n = 305, 5.1%) respectively.

Table 5
Prevalence Rates of BDMH Groups

Group	*n*	Prevalence %	Hypothesized %
ABD	628	10.6	9-19%
SBC	783	13.2	4-13%
MU	305	5.1	9-17%
MH	4233	71.2	57-78%

Demographic differences among BDMH groups

Results of the log linear analysis indicated that consideration for the nesting variable (census) was not necessary (see Table 6)**.** When the chi-square test of independence was performed to examine the relationship between BDMH category and each demographic variable, the relationship between BDMH category and gender [x^2 (3, N= 5948 = 51.43, $p < .001$], grade [x^2 (15, N= 5948 = 104.64, $p < .001$], and broad residence classification [x^2 (9, N= 5949 = 22.32, $p < .05$], were significant. However, interpretation of the Cramer's V effect size rendered these findings practically meaningless, as none of them reached the threshold of a small effect, V = .10 (gender V = .093, grade V = .077, broad residence classification V = .008). See Tables 4 and 7 for full results.

Table 6
Demographic Characteristics of Students in BDMH Groups

	BDMH Group %			
Variable	MH	ABD	SBC	MU
Census Division				
1	18.3 [a]	18.8[a]	19.9 [a]	17.7 [a]
2	17.1 [a]	19.7 [a]	14.7 [a]	18.0 [a]
3	3.6 [a]	3.7 [a]	3.6 [a]	5.9 [a]
4	13.1 [a]	11.5 [a]	13.9 [a]	9.5 [a]
5	4.8 [a]	5.3 [a]	6.6 [a]	4.9 [a]
6	9.4 [a]	12.3 [a]	8.4 [a]	10.2 [a]
7	8.4 [a]	6.4 [a]	8.9 [a]	8.2 [a]
8	17.3 [a]	15.0 [a]	16.3 [a]	19.7 [a]
9	8.1 [a]	1.5 [a]	7.5 [a]	5.9 [a]
Gender				
Male	53.2[a]	43.8[a]	45.8[a]	37.5[a]
Female	46.8[b]	56.2[b]	54.2[b]	62.5[b]
Grade				
5	14.2[a]	7.6[a]	11.1[a]	7.2[a]
6	17.2[a,b]	11.1[a,b]	16.6[a]	10.5[a]
7	18.2[b,c]	16.1[a,b,c]	18.1[a]	19.7[a,b]
8	20.5[b,c]	20.4[b,c]	20.7[a]	18.7[a,b]
9	15.9[c,d]	21.0[c,d]	17.8[a]	22.6[b]
10	14.1[d]	23.7[d]	15.1[a]	21.3[b]
Ethnicity				
Black or African American	17.1[a]	14.8[a]	17.8[a]	16.5[a]
White	51.4[a]	45.4[a]	53.4[a]	48.8[a]
Asian	3.9[a]	3.8[a,b]	2.5[a]	1.7[a]
American Indian or Alaskan Native	1.6[a]	.8[a,b]	2.4[a]	3.4[a]
Native Hawaiian or Other Pacific Islander	.8[a]	1.7[a.b]	1.0[a]	.7[a]
Two or more races	6.6[a]	8.1[a,b]	8.1[a]	10.4[a]
Hispanic	18.6[a]	25.4[b]	14.7[a]	18.5[a]
Family Affluence				
Low	22.3[a]	31.9[a]	24.5[a]	29.5[a]
Middle	52.5[b]	51.5[b]	54.2[a]	52.0[a,b]
Upper	25.2[c]	16.6[c]	21.3[a]	18.5[b]
Medical/Disability Status				
Disabled	40.1[a]	42.6[a]	47.9[a]	49.5[a]
Not disabled	59.9[b]	57.4[a]	52.1[b]	50.5[b]

(Table 6 continued)

Variable	BDMH Group % MH	ABD	SBC	MU
Broad Residence Classification				
Unclassified	7.6[a]	7.2[a,b]	7.0[a]	9.5[a]
Urban	29.9[a]	34.9[b]	28.7[a]	23.6[a]
Suburban	37.1[a]	36.1[a,b]	34.6[a]	39.7[a]
Rural	25.3[a]	21.8[a]	29.6[a]	27.2[a]

Note. Shared superscript letters indicate column proportions do not differ significantly from each other at the p .05 level. Comparisons of superscripts should be made vertically within a given category and column, not horizontally or across categories.

Table 7
Testing K-Way Effects of Census Division in Phase 2 Analyses

Variable	*df*	Pearson χ^2	*p*
Gender	24	13.824	.951
Grade	120	136.276	.147
Ethnicity	144	134.425	.705
Family affluence	48	40.826	.759
Disability status	24	18.283	.789
Broad residence classification	72	61.352	.810

Concurrent validity of BDMH groups

Prior to analyses, each variable was tested to determine if it was necessary to account for the nested nature of the data for each analysis. Models were tested to determine which best fit the data (as described above). Results of these tests are found in Table 9. Data from the results presented below can be found in Tables 8 and 9.

Table 8
Testing the Relationship between Demographic Variables and BDMH Group using Chi-Squared Analyses

Demographic	Pearson χ^2	*df*	Cramer's *V*	*p*
Census division	33.921	24	.044	.086
Gender	51.427	3	.093	<.001
Grade	104.643	15	.077	<.001
Ethnicity	56.237	18	<.001	.057
Family affluence	48.399	6	<.001	.064

(Table 8 continued)

Demographic	Pearson χ^2	*df*	Cramer's *V*	*p*
Disability status	24.349	3	<.001	.064
Broad residence classification	22.319	9	.008	.035

Note. Cramer's *V* effect sizes are interpreted <.10 negligible effect, .10–.29 small effect, .30–.49 medium effect, and >.50 large effect.

Table 9

Solving the Independence Issue by Examining how Census Division Affects the Analyses: A Series of ANOVA Models

Variable	ANOVA Model	-2 Log Likelihood	Change in -2 LL/chi square	Significant Change	Best-Fitting Model
School	1	14219.157			1
Performance	2	14215.468	3.689	No	
Perceptions	3	14215.468	0		
Class Climate	1	14073.248			
	2	14067.910	5.338	Yes*	2
	3	14067.714	.196	No	
Bullying	1	-2203.086			1
Victimization	2	-2203.741	.655	No	
	3	-2206.358			
Bullying	1	-3358.774			1
Perpetration	2	-3360.412	1.638	No	
	3	-3360.412			
Family	1	26089.206			1
Relationships	2	26088.724	.482	No	
	3	26089.167			
Life Satisfaction	1	23961.616			1
	2	23959.384	2.232	No	
	3	23959.384			
Somatic	1	32662.119			
Complaints	2	32647.803	14.316	Yes**	2
	3	32647.575	.228	No	

(Table 9 continued)

Variable	ANOVA Model	-2 Log Likelihood	Change in -2 LL/chi square	Significant Change	Best-Fitting Model
Alcohol	1	-1962.583			1
	2	-1965.635	3.052	No	
	3	-1968.392	2.757		
	1	-3621.139			1
	2	-3622.000	.861	No	
	3	-3623.214			
Cigarettes	1	-6297.417			
	2	-6322.343	24.926	Yes**	2
	3	-6324.761	2.418	No	
Marijuana	1	-6297.417			
	2	-6322.343	24.926	Yes**	
	3	-6324.761	2.418	No	

Note. Models 1, 2, and 3 were ANOVA with BDMH classification as the grouping factor and each concurrent outcome variable as the dependent variable. Model 1 was a standard ANOVA, model 2 included a random intercept for census division, and model 3 included a random intercept for census division and slope for BDMH variability. If the difference between models in -2 log-likelihood meets the critical value, then including this variability in intercept and/or slope improves the model significantly. The best-fitting model was used in the final analysis.

* = Change significant at the $p < .05$ level, ** = $p < .01$ level.

School performance perceptions. A one-way between subjects ANOVA indicated a main effect of BDMH classification on students' perceptions of their school performance, $F(3,5792) = 125.36$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' perceptions of their schools performance by BDMH group are presented in Table 11.

Table 10
Significance and Magnitude of Compared BDMH Group Differences by Concurrent Outcome Variable

Concurrent Validity Variable	BDMH Category		M Diff. (A-B)	SE	*p*	*g* [95% CI]
	(A)	(B)				
School performance perceptions	MH	MU	-.655	.049	<.001	.796 [.772, .820]
	MH	ABD	-.555	.036	<.001	.680 [.657, .703]
	MH	SBC	-.123	.032	<.001	.155 [.132, .177]
	ABD	MU	-.091	.058	.120	.098 [.039, .158]
	SBC	MU	-.523	.056	<.001	.597 [.412, .633]
	ABD	SBC	.432	.045	<.001	.491 [.444, .537]
Class climate	MH	MU	-.655	.049	<.001	.822 [.798, .846]
	MH	ABD	-.549	.036	<.001	.656 [.633, .648]
	MH	SBC	-.169	.032	<.001	.214 [.192, .236]
	ABD	MU	-.106	.058	.410	.112 [.051, .147]
	SBC	MU	-.486	.056	<.001	.436 [.381, .491]
	ABD	SBC	.380	.044	<.001	.432 [.385, .479]
Family relationships	MH	MU	2.668	.135	<.001	1.262 [1.200, 1.324]
	MH	ABD	2.334	.097	<.001	1.085 [1.024, 1.146]
	MH	SBC	.819	.088	<.001	.390 [.331, .448]
	ABD	MU	.335	.158	.208	.118 [-.068, .305]
	SBC	MU	1.849	.153	<.001	.707 [.550, .863]
	ABD	SBC	-1.514	.121	<.001	.580 [.443, .716]
Life satisfaction	MH	MU	1.987	.111	<.001	1.107 [1.055, 1.160]
	MH	ABD	1.964	.080	<.001	1.080 [1.029, 1.131]
	MH	SBC	.596	.073	<.001	.332 [.283, .382]
	ABD	MU	.024	.131	1.00	.013 [-.135, .161]
	SBC	MU	1.391	.126	<.001	.674 [.550, .798]
	ABD	SBC	-1.367	.100	<.001	.661 [.552, .769]

(Table 10 continued)

Concurrent Validity Variable	BDMH Category (A)	M Diff. (A-B) (B)	SE	*p*	*g* [95% CI]	Concurrent Validity Variable
Marijuana use	MH	MU	-.067	.008	<.001	.529 [.525, .533]
	MH	ABD	-.045	.006	<.001	.348 [.344, .351]
	MH	SBC	-.015	.006	.033	.118 [.114, .121]
	ABD	MU	-.022	.010	.142	.112 [.099 .126]
	SBC	MU	-.052	.010	<.001	.316 [.306, .326]
	ABD	SBC	.030	.008	.001	.185 [.176, .194]
Alcohol use	MH	MU	-.109	.012	<.001	.565 [.559, .571]
	MH	ABD	-.067	.009	<.001	.346 [.340, .351]
	MH	SBC	-.047	.008	<.001	.239 [.234, .245]
	ABD	MU	-.042	.014	.023	.171 [.154, .187]
	SBC	MU	-.063	.014	<.001	.270 [.264, .276]
	ABD	SBC	.021	.011	.372	.089 [.076, .101]
Cigarette use	MH	MU	-.095	.011	<.001	.586 [.581, .591]
	MH	ABD	-.050	.008	<.001	.308 [.303, .312]
	MH	SBC	-.038	.007	<.001	.234 [.229, .239]
	ABD	MU	-.045	.013	.002	.196 [.181, .211]
	SBC	MU	-.057	.012	<.001	.251 [.237, .265]
	ABD	SBC	.012	.010	1.00	.054 [.042, .067]
Somatic symptoms	MH	MU	7.438	.241	<.001	.529 [.525, .533]
	MH	ABD	2.873	.174	<.001	.348 [.344, .351]
	MH	SBC	3.992	.158	<.001	.122 [.118, .125]
	ABD	MU	4.565	.284	<.001	.112 [.099, .126]
	SBC	MU	3.446	.274	<.001	.298 [.285, .311]
	ABD	SBC	1.119	.218	<.001	.177 [.167, .188]
Bullying victimization	MH	MU	-.112	.012	<.001	.592 [.586, .597]
	MH	ABD	-.083	.009	<.001	.420 [.424, .435]
	MH	SBC	-.054	.008	<.001	.284 [.278, .289]
	ABD	MU	-.029	.014	.229	.118 [.101, .134]
	SBC	MU	-.058	.014	<.001	.250 [.264, .236]

(Table 10 continued)

Concurrent Validity Variable	BDMH Category (A)	M Diff. (A-B) (B)	SE	*p*	*g* [95% CI]	Concurrent Validity Variable
Marijuana use	ABD	SBC	.029	.011	.048	.124 [.136, .112]
Bullying perpetration	MH	MU	-.071	.011	<.001	.406 [.401, .411]
	MH	ABD	-.047	.008	<.001	.268 [.263, .273]
	MH	SBC	-.045	.007	<.001	.257 [.252, .262]
	ABD	MU	-.024	.013	.365	.116 [.102, .129]
	SBC	MU	-.026	.012	.221	.128 [.115, .140]
	ABD	SBC	.002	.010	1.00	.010 [-.001, .020]

Note. M Diff mean score difference between A and B, g [95 % CI] Hedge's g with 95 % confidence interval, MU Mentally unhealthy, MH mentally healthy, ABD asymptomatic but discontent, SBC symptomatic but content,

Table 11
Concurrent Variable Descriptive Statistics

Variable	Group	*n*	*M*	*SD*
School performance perceptions	MH	4115	1.92	.801
	SBC	766	2.04	.848
	ABD	613	2.47	.910
	MU	298	2.56	.927
Class climate	MH	4104	2.1774	.78110
	SBC	764	2.3469	.86480
	ABD	609	2.7280	.90153
	MU	293	2.8339	1.02057
Bullying Victimization	MH	4115	.0930	.18318
	SBC	765	.1468	.22137
	ABD	613	.1756	.24453
	MU	298	.2049	.25755
Bullying Perpetration	MH	4051	.0892	.16993
	SBC	752	.1339	.19504
	ABD	602	.1358	.20002
	MU	293	.1598	.22197
Family Relationships	MH	4175	8.33	2.035
	SBC	775	7.51	2.443
	ABD	616	6.00	2.793
	MU	296	5.66	3.025
Life Satisfaction	MH	4166	7.87	1.744
	SBC	777	7.28	1.939
	ABD	620	5.91	2.231
	MU	303	5.86	2.407
Somatic Symptoms	MH	4144	21.2917	3.59023
	SBC	760	17.2816	4.95776
	ABD	610	18.4377	4.83354
	MU	298	13.8624	5.05037
Alcohol Use	MH	4070	.0794	.18792
	SBC	756	.1261	.23071
	ABD	599	.1469	.23876
	MU	296	.1888	.25862
Cigarette Use	MH	4070	.0404	.15372
	SBC	755	.0789	.21384
	ABD	600	.0906	.21686
	MU	296	.1357	.25500
Marijuana Use	MH	4051	.0241	.11984
	SBC	746	.0387	.14463
	ABD	593	.0697	.19173
	MU	291	.0924	.22187

Class climate. A one-way between subjects ANOVA with a random intercept for census division indicated a main effect of BDMH classification on students' perceptions of their class climate, $F(3, 5767) = 127.70$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' perceptions of class climate by BDMH group are presented in Table 11.

Bullying victimization. A one-way between subjects ANOVA indicated a main effect of BDMH classification on students' reported bullying victimization, $F(3, 5791) = 61.74$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' bullying victimization by BDMH group are presented in Table 11.

Bullying perpetration. A one-way between subjects ANOVA indicated a main effect of BDMH classification on students' reported bullying perpetration, $F(3, 5698) = 31.81$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for several comparisons (see Table 10). Descriptive statistics for students' bullying perpetration by BDMH group are presented in Table 11.

Family relationships. A one-way between subjects ANOVA indicated a main effect of BDMH classification on students' quality of family relationships, $F(3, 5862) = 304.63$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' quality of family relationships by BDMH group are presented in Table 11.

Life satisfaction. A one-way between subjects ANOVA indicated a main effect of BDMH classification on students' life satisfaction, $F(3, 5866) = 284.95$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' life satisfaction by BDMH group are presented in Table 11.

Somatic symptoms. A one-way between subjects ANOVA with a random intercept for census division indicated a main effect of BDMH classification on students' somatic symptoms, $F(3, 5807) = 522.16$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant differences for all comparisons, and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' somatic symptoms by BDMH group are presented in Table 11.

Alcohol use. A one-way between subjects ANOVA indicated a main effect of BDMH classification on students' alcohol use, $F(3, 5721) = 47.12$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' alcohol use by BDMH group are presented in Table 11.

Cigarette use. A one-way between subjects ANOVA indicated a main effect of BDMH classification on students' cigarette use, $F(3, 5725) = 42.66$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' cigarette use by BDMH group are presented in Table 11.

Marijuana use. A one-way between subjects ANOVA indicated a main effect of BDMH classification on students' marijuana use, $F(3, 5675.64) = 36.71$, $p < .001$. Post hoc comparisons using a Bonferroni adjustment indicated statistically significant and practically meaningful differences for the majority of comparisons (see Table 10). Descriptive statistics for students' marijuana use by BDMH group are presented in Table 11.

DISCUSSION

Interpretation of Results

Prevalence rates of BDMH groups

Overall the pattern of prevalence rates for BDMH groups derived from the PWDS was similar to the hypothesized levels (see Table 5), suggesting that the BDMH classification functioned similarly using the PWDS as when using lengthier combinations of measures (e.g., Eklund et al., 2011, Renshaw & Cohen, 2014, Suldo & Shaffer, 2008). However, it was hypothesized that ABD would be the second largest group and SBC would be the third largest, and this order was reversed in the findings. Additionally, while ABD and MH groups were within the hypothesized ranges, there were slightly more SBC students than hypothesized (i.e., 13.2%, rather than 4-13%) and there were far fewer MU students than hypothesized (i.e., 5.1%, rather than 9-17%). Universal screening results would suggest that 5% of students are at greatest risk (MU), about 25% are at some risk (SBD and ABD), and about 70% are not at risk. These percentages are roughly similar to those commonly presented in the Response to Intervention (RTI) tiers framework (i.e., 5% intense, 15% targeted, 80% universal).

If only psychological distress were measured, 18.3% of students (MU and SBC) would have been identified as at-risk and 81.8% would have been identified as not-at-risk.

Demographic differences among BDMH groups

When the relationship between BDMH category and demographic variables of census division, gender, grade, ethnicity, family affluence, disability status, and broad residence classification was investigated though a few demographic variables were significant, interpretation of the Cramer's *V* effect size rendered these findings practically negligible (see Table 8). It was hypothesized that ethnicity and SES would not be independent from BDMH,

while gender, grade, disability status, and broad residence classification would be independent from it. The results indicate that BDMH group was practically independent from all demographic variables measured. The significant results were likely a byproduct of the large sample size, but the negligible effect sizes suggest that, given the sample, there are no meaningful differences in BDMH groups across demographics. See Tables 4 and 6 for more details.

Concurrent validity of BDMH groups

Recall the null hypothesis for the concurrent validity variables (i.e., $MH > SBC \geq ABD > MU$ for positive concurrent outcomes, and $MH < SBC \leq ABD < MU$ for negative concurrent outcomes). These hypotheses were generally supported. However, the results of this investigation suggest the heuristic could be amended to reflect the relative advantage of the ABD group compared to the SBC group, and the striking similarities between the ABD and MU groups:

MH > SBC > ABD≥ MU for positive concurrent outcomes

MH < SBC < ABD ≤ MU for negative concurrent outcomes

Refer to Tables 8 and 9 for more details. Below are interpretations of specific group contrasts.

MH vs. MU. This contrast examines differences between students with average or high wellbeing and average or low distress, and their opposite counterparts. In each instance, mentally healthy students experienced the most positive overall concurrent outcomes, and mentally unhealthy students experienced the most deleterious overall concurrent outcomes. For each concurrent outcome, the MH vs. MU comparison was statistically significant, with a meaningful effect size. The effect size was large for class climate, family relationships, and life satisfaction,

medium for school performance, marijuana, alcohol, and cigarette use, as well as bullying victimization and somatic symptoms, and small for bullying perpetration (see Table 10). These results support the hypothesis that MH students experience the highest means for positive concurrent outcomes and lowest means for negative concurrent outcomes. These results also support the hypothesis that MU students experience the lowest means for positive concurrent outcomes and highest means for negative concurrent outcomes (see Table 11 for group means and other descriptive statistics).

MH vs. ABD. This contrast examines the added value of measuring wellbeing by comparing those with healthy vs. low wellbeing, when distress is average or low in both groups. For each variable, this contrast was significant, with a meaningful effect size. MH students fare better than ABD students in how they view their family relationships and life satisfaction (with large effects), how they interpret their school performance and how they view class climate (with medium effects), and how often they use substances or are involved in bullying and experience of somatic symptoms (with small effects; see Table 10). These results support the hypothesis that MH students experience higher means for positive concurrent outcomes than ABD students and lower means for negative concurrent outcomes (see Table 11 for group means and other descriptive statistics). Recall that using a unidimensional screening tool, neither MH nor ABD students would be identified as at-risk, yet results show practically meaningful differences between these groups, with MH students experiencing an overwhelming advantage. This lends support for differentiating between them, as these groups are associated with differences in concurrent validity outcomes.

MH vs. SBC. This contrast examines the effect of healthy vs. elevated psychological distress, when wellbeing is healthy in both groups. These results, though statistically significant,

are not practically meaningful (i.e., perceived school performance, marijuana use, somatic symptoms) or have small effect sizes (i.e., perception of class climate, family relationships, life satisfaction, alcohol and cigarette use, and bullying involvement; see Table 10). These results support the hypothesis that MH students experience higher means for positive concurrent outcomes than SBC students and lower means for negative concurrent outcomes, as that was true in the majority of comparisons (see Table 11 for group means and other descriptive statistics). These results are much less dramatic than the MH vs. MU contrast, suggesting the beneficial mitigating effect of wellbeing on mental health.

ABD vs. MU. This contrast examines the effect of normal vs. elevated psychological distress, when wellbeing is low in both groups. Though three of the contrasts were statistically significant, none of the results were practically meaningful (see Table 10). These results do not fully support the hypothesis that ABD students experience higher means than MU for positive concurrent outcomes and lower means than MU for negative concurrent outcomes. While the means do follow this trend, the differences between the groups are not practically meaningful (see Table 11 for group means and other descriptive statistics). This suggests that when level of wellbeing is low, concurrent outcomes are likely poor, regardless of level of distress.

SBC vs. MU. This contrast examines the value-added effect of wellbeing by comparing groups with healthy vs. low levels of wellbeing, when distress levels are elevated in both groups. The contrast was statistically significant for all variables except for bullying perpetration. Small effect sizes were found for bullying victimization, somatic symptoms, alcohol, marijuana, and cigarette use, and perception of class climate. Medium effects were found for life satisfaction, family relationships, and perception of school performance (see Table 10). These results support the hypothesis that SBC students experience higher means than MU for positive concurrent

outcomes and lower means than MU for negative concurrent outcomes (see Table 11 for group means and other descriptive statistics). Note that this discrepancy is larger than the ABD vs. MU comparison, supporting the claim that ABD students are more at risk than SBC students.

ABD vs. SBC. This contrast, like the *MU/MH* contrast, examines two opposite categories. The contrast examines students with low wellbeing and low distress to students with healthy wellbeing and elevated distress. The contrast was practically significant for family relationships and life satisfaction (with medium effect sizes), perception of school performance and class climate (with small effect sizes; see Table 10). In each case with meaningful effect sizes, SBC students experienced preferable concurrent outcomes to ABD students. These results support the hypothesis that SBC students experience higher or similar means than ABD for positive concurrent outcomes and lower or similar means than ABD for negative concurrent outcomes (see Table 11 for group means and other descriptive statistics). This demonstrates, disturbingly, that students currently unidentified by mental health screeners (ABD students) have similar, or more often worse concurrent outcomes than those identified as at risk.

Potential Implications for Practice

In practice, there are several key differences between using the PWDS and a unidimensional screener (such as the student self-report Behavioral and Emotional Screening System, BASC-2) in mental health screening as part of a multiple gating procedure for identifying students for services. For example, the BESS results indicate “elevated” and “extremely elevated” levels of psychopathology, reflecting elevations 1 and 2 *SD* above the mean for psychological distress. Busy practitioners may choose to conduct second gate follow up assessments on students whose scores were “extremely elevated” first, and “elevated” second (Kamphaus & Reynolds, 2007). When using the PWDS, in contrast, students are categorized into

one of four groups based on the results of the wellbeing and distress composite scores (see Table 10 for scoring guide). From there, practitioners can follow up with second gate assessments for students in order of greatest risk: MU, ABD, and SBC.

There may be several advantages to using a BDMH approach with the PWDS. First, it yields groups of three levels of priority, in groups from including the fewest number of students to the greatest (e.g., MU, ABD, SBC), allowing practitioners to focus follow up efforts on students of greater risk first. Second, it identifies ABD students and opens up the possibility for them to receive treatment after follow up assessment. Lastly, delineating risk using one *SD* from the mean rather than two for wellbeing and distress identifies more students and is thus a practical tool in an initial gating procedure.

However, considering that the present and previous studies regarding BDHM have mostly been basic research, much applied research is needed to test the practical utility of using the PWDS to inform mental health service delivery in schools. Practical questions remain such as what percentage of students in each group would go on require follow up services? Would measuring wellbeing in follow up assessment be useful? Is social validity any different for a bidimensional screener as compared to a unidimensional screener?

In addition to affecting at-risk students who may (after further assessment) require intervention, this research has applications for students at the universal level. As wellbeing affects relevant outcomes, universal programs aimed at increasing wellbeing, or prosocial skills, the PWDS may be used not only as an initial screening measure but also to monitor students' bidimensional mental health functioning over time to see how many are remaining in the MH category, or moving from ABD to MH, or shifting from MU to SBC, and so on.

Implications for Future Research

The next logical step in this vein of research is to compare BDMH classifications derived from the PWDS with classifications derived from lengthier behavior rating scales with the same participants. If both measurement systems classify students similarly, then the classification utility of the PWDS will be validated and the measure may be used in lieu of lengthier assessments. Additionally, in this investigation, the same four-group categorical approach used to conceptualize BDMH in previous studies was applied to results from the PWDS. It was done this way to test whether similar results were found using only a brief screener. However, future research in this area may explore the phenomenon using a continuous approach, as this would reveal more nuanced information. Additionally, instead of using a single grouping variable (i.e., BDMH classification) with four possible levels (i.e., MH, MU, SBC, and ABD), which is the approach used in previous studies, future research could also test two grouping variables (i.e., wellbeing and distress classifications) each with two levels (i.e., typical or at-risk), which would allow for evaluation of the main effects and interaction effects for concurrent validity purposes. This would allow for a more sophisticated understanding of how important it is to measure both wellbeing and distress in light of which outcomes researchers are concerned with.

Lastly, in this investigation, category boundaries for BDMH groups were created using composite scores greater than 1 *SD* as a threshold for determining risk status on the PWDS' distress composite, and less than -1 *SD* for determining risk status on the wellbeing composite. This categorization approach is the precedent in previous research on this topic (e.g., Eklund et al., 2011; Renshaw & Cohen, 2014; Suldo & Shaffer, 2008). However, future investigations may choose to explore whether the BDMH schema is still useful when category boundaries are drawn at 1.5 or 2 *SD* above and below the mean, which would indicate more "clinical" levels of

distress. It is likely that at more extreme levels the relationship between wellbeing and distress becomes more mutually exclusive, but research has yet to explore the usefulness of different cut-off points for the BDMH classification. Inclusion of measurement of wellbeing may be especially useful when measuring the population of the "worried well," students with mild or moderate mental health concerns. It is therefore possible that a unidimensional model for measuring mental health is more appropriate when measuring acute psychological distress. If this is the case, the measurement of wellbeing would be most appropriately used when conducting large-scale public health work, such as universal screening in schools, but would may not be useful for informing the treatment of individual clients with high needs. Much basic and applied research is therefore needed to test the boundaries of the BDMH model for informing mental health work in schools.

Limitations

Mean substitution was used to manage missing data of the PWDS due to limitations in using SPSS to analyze the data; however, the multiple imputations technique would have been a more ideal strategy (Schlomer et al., 2010). Additionally, of the 10 concurrent validity variables, five were altered using the log 10 transformation, and (though improved) three variables did not meet establish criteria for normality (i.e., alcohol, cigarette, and marijuana use). The results of these items should be interpreted with caution and the results considered exploratory in nature. Lastly, only self-reported student data was used to investigate the concurrent validity of the BDMH model using the PWDS. Future research could use more objective and rigorous means of data collection (e.g., data found in educational records such as report cards or office discipline referrals, classroom observations of behavior) from multiple sources in order to provide converging evidence for student outcomes. Also, the items in the HBSC limited this

investigation, but future investigations should measure other concurrent validity variables that are more important to school functioning (e.g., grit, attendance, academic engagement, prosocial skills).

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APPENDIX
IRB #E8793 APPROVAL

ACTION ON EXEMPTION APPROVAL REQUEST

Institutional Review Board
Dr. Robert Mathews, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
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TO: Sarah Bolognino
Psychology

FROM: Robert C. Mathews
Chair, Institutional Review Board

DATE: April 30, 2014
RE: **IRB#** E8793

TITLE: An exploration of individual, peer, and school determinants of psychological wellbeing and distress in American youth

New Protocol/Modification/Continuation: New Protocol

Review Date: 4/30/2014

Approved X **Disapproved**_____

Approval Date: 4/30/2014 **Approval Expiration Date:** 4/29/2017

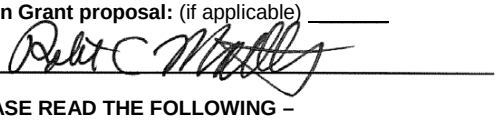
Exemption Category/Paragraph: 4

Signed Consent Waived?: Yes

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable): _____

Protocol Matches Scope of Work in Grant proposal: (if applicable) _____

By: Robert C. Mathews, Chairman 

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. SPECIAL NOTE:

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

VITA

Sarah J. Bolognino received her Bachelor's of Science in psychology with minors in biology, philosophy, and Peace & Global Studies from Le Moyne College in Syracuse, New York. While there she completed a gratitude intervention study as part of her honors thesis, which contributed in her broad research interest in wellbeing in schools. She will graduate in December 2015 with a master's degree from Louisiana State University, en route to earning a doctoral degree in school psychology at the same university.