Longitudinal Factorial Invariance of a Brief Measure of Affect and Calm-Focus
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Abstract:	Mindfulness-based practices (MBP) for school-aged children are increasingly common in the United States. Positive and negative affect are theoretically and empirically associated with school outcomes, and these constructs are likely to be impacted by school-based MBP. Furthermore, mindful states, such as being calm and focused, are targeted by MBP as a potential causal mechanism to improve learning and behavior. This study describes a test of longitudinal factorial invariance for a brief measure of affect states plus a state of calm-focus that is appropriate for use in mindfulness intervention studies with elementary school-aged children. Data were collected from 97 fourth grade students in an urban elementary school that was about 46% Hispanic and 44% Caucasian. Students listened to one of six different conditions each day for 24 school days. There were four individual mindfulness modules (e.g., cross-connect, pause buttons, belly breathing, mindful minute), one condition was all four of the modules together, and one condition was a control activity (i.e., a grade-appropriate story presented via audio recording). Students provided self-report of positive and negative emotions plus calm-focus immediately before and after the presentation of the audio. Results show high levels of internal consistency for the scales, low correlations between scales, and factorial invariance in the pre- and post-test design for five of the six conditions. These findings support the use of this measure in studies with older elementary school students. Future studies should further document construct validity through external validation of the scales.

Running Head: BRIEF MEASURE AFFECT PLUS CALM-FOCUS

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BRIEF MEASURE OF AFFECT PLUS CALM-FOCUS

ABSTRACT

Mindfulness-based practices (MBP) for school-aged children are increasingly common in the
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Longitudinal Factorial Invariance of a Brief Measure of Affect and Calm-Focus

Mindfulness training for children and adolescents is an increasingly common activity with substantial growth in research and professional interest. Mindfulness-based practices (MBP) include yoga, meditation, attentive breathing, body scanning, and a wide variety of other activities that develop a calm focus on the present.[1] In 2012, the National Health Interview Survey (NHIS) documented that about 3.2% of children aged 4 to 17 had engaged in mindful activities.[2] There were dramatic changes in engagement with mindful practices from 2012 to 2017; with 8.4% of students reportedly participating in yoga in 2017, compared to 3.1% in 2012, which is a 270% increase.[2] Similarly, in 2017 the NHIS found that 5.4% of students engaged in meditation, compared to 0.6% in 2012, a 900% increase.[2] Parents appear to be a major influence on children developing mindful practices. For instance, the NHIS found that children whose parents engaged in complimentary or alternative health practices are about five times more likely to engage in Complementary and Alternative Medicine (CAM), including mindfulness, compared to parents who do not engage in CAM.[3]

Along with the growth in engagement with mindfulness practices supported by families, there has been increasing support for mindfulness practices in schools. Indeed, the authors of the NHIS summary noted that the integration of yoga into physical education classes is one of the major factors contributing to the growth in yoga practice among children and adolescents.[2] There is practical and empirical support for more widespread dissemination of school-based mindfulness programs.[1] Specifically, a considerable number of studies provide evidence for the acceptability and feasibility of school-based mindfulness programs,[4,5] and a comprehensive review found medium effect sizes (i.e., *g* of .31 to .32, depending on the design) across 76 studies, with an increased medium effect size of .46 for studies with follow-up,[6] thus supporting

effectiveness. However, as might be expected from a new area of research, the methodological

quality of studies of school-based mindfulness varies widely and there is considerable room for

improvement.[8]

One of the common recommendations of reviews of the methodology of school-based

mindfulness studies is to improve the measurement of key constructs and link changes in

mindfulness or other relevant constructs with school-related outcomes.[5,7,8] For instance, to

demonstrate that school-based mindfulness works, there needs to be strong evidence of

intervention effects on proximal outcomes of MBP, such as increases in positive affect, that are

associated with better school outcomes (e.g., grades, behavior, and attendance). Reviews of

high-quality studies have found beneficial effects of MBP on improving positive affect and

decreasing negative affect.[6,10] Indeed, measuring positive and/or negative affective states was

the second most common outcome measured in the studies reviewed by Klingbeil et al.;[6] the first

being internalizing symptoms reported by 29 studies (60.41%), and the second as positive and/or

negative affect reported by 25 studies (52%).

In addition to looking at outcome variables, it is also important to examine process

variables that may mediate the effect of the MBP on the outcome. The developers of the MBP

(more details are included in the Method section below) that was evaluated as part of the larger

study for this paper identified a state of "calm focus" as the therapeutic process variable. A

common element in various definitions of mindfulness involves the focus of attention.[1] Also,

definitions of mindfulness often stress the importance of adopting a non-judgmental and calm

state of awareness.[11] Consistent with these ideas, a structural equation model of cross-sectional

data collected from college students validated this two-factor model of mindfulness.[11] This

study found that the combination of attention and acceptance was associated with clarity, which

was associated with better self-regulation of negative emotions. Thus, developing a calm, non-judgmental focus may serve as the intervening state or mechanism linking mindfulness with management of negative emotions.

It is not currently clear if the state of calm focus represents the construct of mindfulness or if it reflects emotional and behavioral regulation (EBR), which could be result of mindfulness. Both constructs are important in school-based MBP research. In a meta-analysis review,[6] the researchers reported that 29% of the studies they reviewed examined changes in mindfulness, which was the most commonly measured therapeutic process variable (i.e., putative mechanism of action). The next most common process variable in the review was emotional and behavioral regulation, which was reported in 11 of the 48 studies (23%). Given that the state of calm focus (CF) was critical to the developer's theory, and could measure mindfulness or EBR, we added items measuring CF. The current study examines if CF is a distinctive factor that may be used as a process measure in MBP practices.

It is noteworthy that the mindfulness and EBR measures did not differentiate between *state* or *trait* mindfulness.[6] The program evaluation research that was part of the larger study was interested in examining changes in affective and CF *states*. We are not aware of any studies examining the construct validity and factorial invariance of measures of CF states with measures of positive and negative affective states. Hence, an important step in school-based mindfulness research should be to document the validity of measures used to assess changes in affective and CF states. Thus, the purpose of this paper is to examine the factorial structure of a brief measure of positive and negative affect as well as a CF state that can be used in studies of school-based mindfulness. In addition to the relative popularity of measures of affect and CF in the extant literature, [6] we also provide a brief theoretical rationale for studying these constructs. This

includes a conceptual description of mindfulness and the expected benefits of providing

mindfulness interventions in school settings to increase positive affective states, decrease

negative affective states, and create a calm and focused state. Then, we examine prior research

on the measurement of affect and mindfulness in children. Our hypothesis is that adding calm

and focus state items to the 10-item PANAS will result in a measure that has three factors:

positive affect, negative affect, and Calm-Focus. This three-factor scale could be very helpful in

studies that need brief, easy to use measures of affect and CF states that can be used to evaluate

mindfulness interventions in school.

Mindfulness and Affective States

In addition to improving self-regulation of negative emotion, some of the benefits of

mindfulness can arise from increasing positive affect. According to the Broaden and Build

Theory, increases in positive affect have many desirable effects relevant to school performance;

including broadening thought and behavioral repertoires, and increasing engagement in novel

activities and social relationships.[12] Even though positive affective states are transient, they

have lasting consequences on multiple brain and body systems that lead to sustained, upward

spirals in well-being.[13] Thus, increases in positive affect, as well as decreases in negative affect,

are highly desirable results that should be measured in studies of school-based mindfulness

interventions.

There is a robust literature base on the measurement of affect, and some debate about the

stability of different structural models.[14] In the adult literature, studies have found three

dimensions of affective states: emotional valence, energetic arousal, and tense arousal.[15] Factor

analytic studies of data provided by older elementary school students found two separate factors

for each dimension. For instance, emotional valence had positive and negative affect factors.[16]

One of the most efficient measures of the emotional valence dimension is the 10-item Positive and Negative Affect Schedule (PANAS).[16]

In addition to emotional valence, the program developers of this current study also wanted to measure a state of calm-focus in the students. These concepts are frequently mentioned in qualitative studies of the school-based mindfulness literature, particularly in the context of seeking relaxation and using focused attention to manage emotions.[17] In this study, to capture the energetic arousal dimension of affective states, which includes alertness and tiredness components, we added an item that rated being focused. To cover all of the three dimensions of affective states, we also added an item measuring calmness to represent tense arousal, which has calmness and tension components.[15]

There are various ways to practice mindfulness that can change affect, calm, and focus including breathing exercises, body scanning, meditation, Tai Chi, and yoga.[18-22] It is currently unclear if the CF state is distinct from positive and negative affective states.

The Current Study

In this study, the 12-item survey was given to fourth grade students before and after a daily mindfulness activity for 24 school days in an effort to measure changes in positive and negative affect plus calm-focus. These data were analyzed for factor structure and factorial invariance between two time points (pre- and post-intervention) repeated throughout the duration of the intervention, enabling a longitudinal comparison. We anticipated finding a three-factor solution as the best fit for the data: positive affect, negative affect, and Calm-Focus. Further, we expected the factorial structure to be stable pre- and post-administration surrounding the daily mindfulness activity that lasted about five minutes.

METHOD

Participants

All students enrolled in the fourth grade at an urban elementary school in the southwestern region of the United States were asked to provide rating data for this study. The school has been providing daily mindfulness activities for the last two years using a curriculum called Present Time Kids™ (PTK).[23] The current study was part of a larger study evaluating PTK and its components (yet to be published). The inclusion criteria for participants in this measurement study were that the students attended the regular education classes in the fourth grade, participated in the PTK mindfulness activities, and had attained parental permission, and given personal assent.

This study was approved by the creators of PTK, the school principal and teachers at the school, the Committee for the Protection of Human Subjects at the University [masked for review], and the Review Board at the participating school district. Parents received the study cover letter with the attached consent form at an open house. The students were given about two weeks to bring back their signed permission slips before the start of data collection. Students who had parental permission were asked for assent during the start of the data collection. A total of 105 of 114 potential participants obtained parental permission and assented to participate in the study.

Due to privacy concerns raised by the school and district IRB, only school-level demographics were obtained. The demographic characteristics of the students and teachers at the elementary school are provided in Table 1. Consistent with the surrounding neighborhood, the school race and ethnicity were primarily Hispanic (46%) and White (44%). About half of the students were identified as Gifted and Talented, and a very small percentage (4%) of students

were in special education. Also, a very small percentage (4%) of students said they were

bilingual or that English was a second language (ESL).

[Table 1 about here]

Measures

Modified Positive and Negative Affect Schedule for Children (PANAS-C)

The 10-item PANAS-C is widely used, well-studied measure of positive and negative

affect.[16,24] The original PANAS-C has 12 adjectives measuring positive affect and 15 adjectives

measuring negative affect with favorable psychometric properties.[16] Ebesutani and colleagues[24]

examined the item characteristics (i.e., difficulty and discrimination) of the original PANAS-C

and shortened the original version into ten items that consist of adjectives that are associated

with five positive (happy, cheerful, proud, joyful, and lively) and five negative affective states

(sad, scared, miserable, afraid, and mad). The original instructions ask the student to rate how

often they have felt this way during the past week using a five-point scale with responses: 1 =

very slightly, 2 = *a little*, 3 = *moderately*, 4 = *quite a bit*, and 5 = *extremely*.[24]

The initial study of the 10-item PANAS-C found two predicted factors, one for positive

affect and another for negative affect, and both factors had adequate internal consistency

(Cronbach's alpha > .80) using a diverse sample of children between the ages of 6 to 18,

including a clinical and school-based sample.[24] Furthermore, the 10-item PANAS-C performed

as well as the original 27-item PANAS-C[16] in predicting anxiety and depression symptoms.

Taken together, the reported analyses support the validity of the 10-item PANAS-C for research

and clinical work.

In this study, the authors expanded the 10-item PANAS-C by adding two additional items

related to mindfulness state: calm and focused. The calm and focused items were added at the

request of the PTK intervention developers to provide a brief measure related to mindfulness. Of

note, the original 27-item PANAS[16] included calm, but was found to have the lowest

discrimination parameters (factor loadings) for the PANAS-C.

The other modification to PANAS-C was to the wording and anchors in an effort

to make the scale more understandable for the fourth-grade students and suit the purposes

of the study. After a pilot administration that revealed some confusion with the original

anchors, we changed the PANAS-C choices to a five-point Likert scale as follows: 0 =

not at all, 1 = *a little,* 2 = *moderately,* 3 = *quite a bit,* 4 = *extremely*. We also changed the

instructions of reporting the affect from "during the past week" to the current states:

"There are ten words below that describe different feelings and emotions. Read each

item and then circle one number to indicate how much you feel that way **right now**."

The 12-item PANAS+CF (PANAS plus Calm-Focus) survey is illustrated in the

Appendix.

Mindfulness Curriculum: Present Time Kids™

Present Time Kids™ (PTK) [17] is coordinated by independent service providers who

created and supported this mindfulness curriculum throughout the school. The curriculum is a

neurological theory-based intervention that has been delivered at the school for the past three

years. Once a day, teachers play audio recordings that guide the students through four brief

activities that take less than one minute each to complete: belly breathing (pranayama), mindful

minute, pause buttons, and cross connect.

According to the creators of the mindfulness curriculum, the exercises were developed to

rewire students' neural pathways for calmness, focus, and engaged learning**.** Each exercise is

thought to target different neural regions. *Belly Breathing* is a type of breathing that prompts

students to inhale and exhale while targeting their belly or diaphragm. This is a well-established practice from yoga and mindfulness, falling under the general category of *pranayama*. *Cross Connect* is a contralateral exercise that uses both sides of the body and, presumably, both sides of the brain. During cross connect, the student is required to sit up straight with their hands on their lap and move their arm slowly across from one side to another. Students are expected to focus their eyes on their hand and follow it as they move their arm across the midline. *Pause Buttons* is an exercise that requires students to gently place their thumbs on their "neurovascular points" on their forehead as they gently breathe and focus on the activity. *Mindful Minute* is an exercise that allows students a time to give thoughts a break by practicing the skill of reacting less to distractions. Students are expected to sit up straight with their feet on the ground and encouraged to close their eyes and intentionally pay attention to what is happening right now. The PTK mindfulness exercises are delivered in an audio recording that incorporates all four of the mindfulness exercises in less than five-minutes.

For the purposes of the larger study, each of the four individual PTK components were studied separately relative to the combined (all four together) and a control condition, which were recordings of four grade-level stories read aloud. Each story is different from the others and completed in about the same amount of time as the PTK conditions. These stories were collected from a curriculum-based measurement program called AIMS-Web.

Procedures

This study is a subset of a larger study that included other measures (i.e. observations and activity preference survey). Before data collection, the researchers pilot-tested the surveys on the students. Based on the pilot-test, the survey anchors and directions were modified to promote clarity (see previous comments about modifications to the PANAS), and logistical

procedures were improved, such as providing definitions and organizing distribution of the surveys.

The recordings of the six different conditions were presented on separate days: belly breathing, mindful minute, pause buttons, cross-connect, combined mindfulness, and the control. To control for order effects, the six different conditions were presented in random order within four six-day cycles during the 24 school days of data collection. The research team used the consent forms and student ID numbers to inform research assistants of which students were part of the study. Research assistants passed out the surveys to all students who had consented, and students were told to write their student ID number on the top right of the survey.

Each day, every classroom was assigned at least one research assistant to administer the surveys. The research assistants distributed the surveys and read the script on the survey administration checklist before the mindfulness exercise. Definitions of the survey anchors were projected on the smartboard for the students to refer when necessary. After completing the pre-survey, teachers played the randomly assigned recording for the students and all students engaged in the exercise, regardless of participation in the study. After the recording ended, research assistants asked the students to complete the post-surveys and collected them. The students that did not have consent to participate were given a blank sheet of paper that were collected along with the other surveys. The teachers and research assistants were blind to the study's hypotheses. There were no incentives given for study participation.

Statistical Analysis

The overarching study design utilizes a counter-balanced within-subjects design. The dependent variables (DVs) of interest were positive affect, negative affect and calm-focus (PANAS+CF). There were two within-subject factors in this study: the time of when the DVs

were measured (pre- and post-test scores) and the six different treatments (i.e., active control condition, full PTK, belly breathing, cross connect, pause buttons, and mindful minute). One clear advantage of utilizing a within-subjects design is that any individual differences, including mindfulness experiences, are controlled for and comparisons are made internally, within each participant. The conventional methods for experimental studies use ANOVA on composite scores to make statistical conclusions comparing the average DV scores across the studied factor levels. However, this study focuses on the item-level data examining measurement validity that should precede even before examining the intervention effects.

A confirmatory factor analysis (CFA) model of PANAS+CF was fitted using the structural equation modeling (SEM) framework. Positive affect was measured by five items (joyful, cheerful, happy, lively, and proud), negative affect was measured by five items (miserable, mad, afraid, scared and sad) and mindful state was measured by two items (calm and focused). The three-factor CFA model simultaneously fitted for the pre- and post-treatment is shown in Figure 1. This model was fitted to data for each of the treatment conditions separately. Data across the four time points were averaged for analyses.

[Figure 1 about here]

Four models were subsequently fitted to evaluate longitudinal factorial invariance across pre- and post-treatment.[25] Factorial invariance is a crucial test to ensure that a measurement can be uniformly used across different subpopulations (e.g., gender, race/ethnicity) or different time-points (e.g., before and after intervention). It accesses whether the factorial structure (i.e., the relationship between the latent factors and the observed measurements) and its parameters (e.g., factor loadings, intercepts, and residual variances) are essentially equivalent across different subpopulations/time-points. Only after successful verification of factorial invariance, we can use

and compare the observed scores across different subpopulations/time-points. There are sequential factorial invariance tests that can be evaluated.[25] In the following, we describe the sequential longitudinal factorial invariance tests for the current study.

In the first step, configural invariance was evaluated by fitting the three-factor model simultaneously for pre- and post-treatment (see Figure 1). Note that in this model the residual covariances for each item between pre- and post-treatment (the double-headed arrows in the middle) were specified to account for shared variability for the same items across time points. Second, using the same configural invariance model from step 1, the factor loadings were restricted to be equivalent between pre- and post-treatment ("weak invariance" model). Third, starting with the model from step 2, the intercepts between pre- and post-treatment were restricted to be invariant ("strong invariance" model). Finally, additional to the specifications in the strong invariance model, the residual variances and covariances were restricted to be equal between pre- and post-treatment ("strict invariance" model).

Evaluation of the proposed models was done by examining the fit indices in SEM. Chi-square statistics provide exact fit of the model estimated variance-covariance matrix to the data variance-covariance matrix of the items. Statistical significance indicates that the model does not fit the data; however, statistical decisions based on chi-square statistics are dependent on sample size and therefore, incorrect decisions can be made.[26,27] Therefore, we used alternative measures of model fit when the model did not statistically fit the data.

Among the alternative fit indices in SEM, the Root Mean Square Error of Approximation (RMESA)[28], the Comparative Fit Index (CFI)[29,30] and the Standardized Root Mean Square Residual (SRMR)[26] were considered. These three indices represent a range of options, and provide a balanced examination of the model fit. A RMSEA below .08 suggests adequate fit and

over .10 suggests poor fit.[31] A CFI over .90 indicates adequate fit and a SRMR below .10

suggests adequate fit.[31] The RMSEA was considered first when the three approximate fit indices

did not agree with each other since RMSEA accounts for model complexity while CFA and

SRMR do not.

Assessment of factorial invariance between pre- and post-treatment was done by

examining the change in chi-square with corrections for non-normality (i.e., the Satorra-Bentler

chi-square difference test, S-B $\Delta\chi^2$)[32], change in RMSEA ($\Delta RMSEA$), change in CFI (ΔCFI) and

change in SRMR ($\Delta SRMR$). A $\Delta CFI < -.05$ accompanied with a $\Delta SRMR > .025$ and

$\Delta RMSEA > .01$ suggest the model restrictions need to be relaxed, indicating non-invariance in

the model parameters of interest.[26]

After investigation of factorial invariance between the pre- and post-treatment measures,

the inter-factor correlations were examined. Discriminant validity of the positive, negative and

mindfulness factors were evaluated by examining their inter-factor correlations within the same

time point. If the correlations between factors are too high (e.g., $r \geq .90$), the factors are not

discriminable and factors might have to be merged together. Stability of the measures was

measured by the correlations between pre- and post-treatment for the same factor. A too low

correlation (e.g., $r \leq .20$) suggests that the factor is not a consistent measure across time (i.e.,

low test-retest reliability). All statistical analyses were done in Mplus 8.1.[33]

RESULTS

Sample statistics of the PANAS+CF items for the overall sample are given in Table 2.

Many of the items were skewed and had a high kurtosis. Especially, students' responses were

focused at the low categories (0s and 1s) for the negative affect items (sad, scared, miserable,

afraid and mad). Additional sample statistics including item-level correlations for each treatment

condition are given in the Appendix. Since most of the PANAS+CF items were non-normally distributed, the maximum likelihood estimator with robust standard errors (MLR)[34] was used to estimate the models.

[Table 2 about here]

Factorial Invariance Analysis

The first invariance model involved specifying the same factor structure between the pre- and post-treatment at the same time. The three-factor model with correlated uniqueness between items "afraid" and "scared" fit adequately to the pre- and post-treatment data for all treatment conditions except for the Pause Buttons condition. Specification of the correlation between the two items suggested that there was shared variability (a "fear" factor) above and beyond the negative affect factor. For all conditions, the chi-square statistic was significant ($p < .001$) and SRMR was above .10 (except for the active control condition; SRMR = .09) indicating significant misfit. However, the CFA and the RMSEA suggested that the model fit the data adequately, CFA > .90 and RMSEA < .10, respectively (except for the Pause Buttons condition; CFA = .88 and RMSEA = .12). See Table 3 for more details on the fit statistics for each condition. To summarize, with exception of the Pause Buttons condition, the three-factor structure with correlated uniqueness was invariant between the pre- and post-treatment data for all other conditions. For the Pause Buttons condition, subsequent analyses were not conducted since the configural invariance model produced poor fit.

[Table 3 about here]

Weak invariance was assessed by constraining the factor loadings between pre- and post-treatment to be equivalent. The S-B $\Delta\chi^2$ tests revealed that weak invariance held for the full PTK condition ($p = .36$) and Mindful Minute condition ($p = .05$). In contrast, the factor loading

constraints produced statistically significant worse fit for the active control condition ($p < .001$),

Belly Breathing condition ($p = .002$), and Cross Connect condition ($p = .004$). However, ΔCFI,

$\Delta RMSEA$, and $\Delta SRMR$ between the configural and weak invariance model for the active control,

Belly Breathing, and Cross Connect conditions revealed that the misfit was not substantial, ΔCFI

$> -.01$, $\Delta RMSEA < .01$ and $\Delta SRMR < .01$ for all three conditions (see Table 3 for details).

Therefore, we concluded that weak invariance between pre- and post-treatment was established

for the data for all five conditions except for Pause Buttons.

Strong invariance was evaluated by restricting the intercepts to be equivalent between

pre- and post-treatment on top of the weak invariance model. The S-B $\Delta\chi^2$ tests between the

weak and strong invariance model were all statistically significant for the five conditions (except

the Pause Buttons), $p < .05$. However, the misfit was not substantial supported by $\Delta CFI > -.01$,

$\Delta RMSEA < .01$ and $\Delta SRMR < .01$ for all five conditions (see Table 3 for details). Therefore, we

concluded that strong invariance between pre- and post-treatment was established for the data for

all treatment conditions except for Pause Buttons.

In the fourth and most stringent assessment of factor invariance, strict invariance was

evaluated by restricting the residual variances and covariances (covariance between "afraid" and

"scared") to be equivalent between pre- and post-treatment. Since the S-B $\Delta\chi^2$ tests already

rejected the strong invariance model for all conditions, only ΔCFI, $\Delta RMSEA$, and $\Delta SRMR$ were

used to evaluate strict invariance. As a result, $\Delta CFI > -.03$, $\Delta RMSEA < .01$ and $\Delta SRMR < .01$

for all conditions except for Pause Buttons (see Table 3 for details). Therefore, we concluded

that strict invariance between pre- and post-treatment was established for the data for all

treatment conditions except for Pause Buttons.

Inter-Factor Correlations

The inter-factor correlations estimated from the strict invariance model for all conditions (except for Pause Buttons) are reported in Table 4. The correlation between positive affect and negative affect were trivial (close to zero) for both pre- and post-treatment across treatment conditions, $-.20 < r \leq .10$. There were trivial to small negative associations between negative affect and Calm-Focus for both pre- and post-treatment across active control, full PTK, Belly Breathing and Cross Connect conditions, $-.40 < r < 0$. There was a trivial positive correlation ($r = .05$) between negative affect and Calm-Focus before the Mindful Minute condition. There was a small to medium positive correlation between positive affect and Calm-Focus for pre-treatment ($.20 < r < .50$) and post-treatment ($.48 \leq r \leq .60$) across treatment conditions. In conclusion, there were no correlations that were large enough to suggest factors should be merged. This result indicated that positive affect, negative affect and Calm-Focus were distinct factors that have adequate discriminant validity.

[Table 4 about here]

High stability of the positive- and negative-affect factors was observed. There was high positive correlation between pre- and post-treatment positive affect, $.87 \leq r \leq .93$ across treatment conditions. Similarly, there was high positive correlation between pre- and post-treatment negative affect, $.85 \leq r \leq .93$ across treatment conditions. The Calm-Focus factor also had adequate stability across treatment conditions, but the correlations were smaller than positive- and negative-affect, $.49 \leq r \leq .58$. Furthermore, internal consistency for the current sample was $\alpha = .98$ for positive affect, $\alpha = .99$ for negative affect, and $\alpha = .97$ for Calm-Focus pre-treatment and $\alpha = .96$ for positive affect, $\alpha = .99$ for negative affect, and $\alpha = .97$ for Calm-Focus post-treatment. These results supported that the PANAS+CF items were reliable measures of positive affect, negative affect, and calm-focused states.

DISCUSSION

Mindfulness based practices are growing in popularity in US schools and are increasingly encountered or used by mental health professionals and other personnel to support student well-being. Some have argued that mindfulness is an evidence-based practice ready for dissemination;[1] however, many others have conducted reviews that suggest that there are significant methodological limitations in the pertinent research and better studies need to be conducted.[4,7,8] Critical outcomes for school-based mindfulness are improvements in grades, test scores, attendance, and behavior.[5] To demonstrate that mindfulness mediates these changes, there is a need for brief, reliable, valid, and developmentally appropriate measures proximal outcomes of MBP, such as affective states, and the process variables that lead to those states, such as mindfulness and emotional or behavioral regulation. Affective states and mindfulness measures are the most commonly reported measures in MBP research, and mindfulness and EBR are have been the most commonly reported process variables. However, the currently available measures of affective and mindfulness or EBR states have not been examined psychometrically for construct validity with elementary school-aged children.

To fill the gap in the literature on psychometric information on the most commonly used measures in mindfulness studies, we provide the first psychometric analysis of a modified scale, the PANAS plus Calm-Focus (PANAS+CF). The scale builds on the solid history of the Positive and Negative Affect Schedule and adds a two-item Calm-Focus factor based on evaluation considerations and the research literature. The results show strong support for a stable factor structure, high internal consistency reliability, and discriminant validity between positive affect, negative affect, and a calm-focus factor. We believe this measure can be used in

studies that require brief measures pertinent to MBP. This PANAS+CF scale may be especially appropriate for younger populations or in studies with frequent repeated measurements.

This study is unique for measuring factorial invariance across time, in this case pre- and post-intervention. Factorial invariance is an extremely important, but often neglected issue in longitudinal studies[25]. Sound comparisons between factor scores pre- and post-treatment can only be made when we are actually measuring the same constructs longitudinally. Otherwise, the pre-post scores would not be comparable because the underlying nature of the scale has changed. Failing to account for the stability of the factorial structure could lead to incorrect inferences about student outcomes owing to unknown changes in the measurement. This is an important issue for researchers who often use quantitative scales to assess the change from pre- to post-intervention. Correspondingly, this investigation is an example of the process of conducting a thorough analysis of factorial invariance.

In this study, the PANAS+CF was robust to treatment effects in five of the six conditions. Thus, we believe the PANAS+CF can be used with confidence in studies of MBP. However, like all measures, the PANAS+CF should be monitored for factorial invariance when used in studies of other interventions and diverse populations. Additionally, future studies of the PANAS+CF should look at further validation in terms of predictive or criterion validity. The current study only addressed psychometrics related to the items of the scale. This included sophisticated assessment of the factor structure and factorial invariance, inter-factor correlations, internal consistency reliability, and test-retest reliability. Future investigations should develop a nomological net with predicted patterns of correlations with external variables to the PANAS+CF such as grades, test scores, school behavior, and attendance. A critical test of the

PANAS+CF is if this measure is a valid and sensitive measure to other mindfulness interventions.

It is also very important through future research to determine the precise meaning of the CF factor. It could be capturing an aspect of mindfulness, and thus could be a process variable. However, some disagree that CF is a state of mindfulness, so other possibilities should be considered. For instance, CF could be the result of mindfulness, similar to the state of Clarity reported in a comprehensive review of measures of mindfulness pertinent to regulation of negative affect. In the present study the CF factor was prescribed by the program developers and was one of the few variables in the study was sensitive to intervention effects. Thus, it seems worthy of further use and evaluation in MBP related research.

Limitations and Ideas for Future Studies.

A strength and limitation of this study was that it was conducted with fourth grade students. The good psychometric results suggest this scale is comprehensible to young participants and, therefore, should be comprehensible to older students and adults. There is rapid growth in studies of mindfulness in schools, and the PANAS+CF may meet the need for a brief, valid, and age-appropriate measure to evaluate mindfulness intervention effects. Validation of the PANAS+CF with older populations is recommended, to explore the possibility of differential understanding of affect, mindfulness, emotional and behavioral regulation, and calm-focus based on developmental level.

PANAS+CF is a brief measure intended to detect rapid changes in affect and CF states. For a more comprehensive measure of long-term change in trait mindfulness, measures such as the Five Factor Mindfulness Scale (FFMS) should be preferred. Studies of the FFMS have mostly been done with adults, and we do not know if elementary school students can

differentiate among variable sub-types of mindfulness or to what extent the FFMS measures states verses traits. Researchers should be clear on what aspects of mindfulness they wish to measure. In this study the developers were interested in calm-focus. Although this CF state does not completely capture the complex construct of mindfulness, a longer measure with trait factors would not be workable with multiple administrations (i.e., 48 total in this study), and sensitive enough to capture short-term changes.

Finally, the demographics of the sample may limit generalization of our results, so replication is encouraged. The majority of the students were White and Hispanic and half of them were in the gifted/talented program, so this sample may have some unique linguistic, cognitive, and socio-economic distinctions. Future studies should consider sample diversity with respect to demographics that represents the population of interest of the researchers.

Conclusion

The newly developed PANAS+CF scale is a reliable, stable, internally consistent measure that meets a need in MBP research and school-based practice. The small number of items means it can be easily added to other assessment batteries without substantially increasing response burdens. The constructs of positive affect, negative affect, and CF could be important outcomes in and of themselves, with clear support in the research literature for examining affective changes. The Broaden and Build Theory explains how increasing positive affect can create an upward spiral in mood that is associated with increased curiosity and other cognitive-affective states that are associated with behaviors that promote learning (e.g., approach and listening). The opposite is true with negative affect, which can create a downward spiral in mood associated with withdrawal, narrowed focus, and other cognitive-affect states that are antithetical to learning. The state of calm and focus, are often sought in classroom settings, and

have many benefits[1]. However, mindfulness is a relatively new area in education and age-appropriate measures of mindfulness are still being developed. This study supports the validity of a novel, two-item measure of the state of calm-focus for older elementary school children. The calm-focus factor is distinct from positive and negative affect and is stable in the context of intervention studies. Changes in affective and calm-focused states are thought to mediate the relationship between mindfulness-based programs and school or developmentally appropriate outcomes. Further investigation of measures like the PANAS+CF in school settings to examine relationships with academic outcomes such as grades, attendance, and behavior could identify the proximal effects of MBP, thus guiding the development of evidence-informed mindfulness interventions in schools.

The unique new piece of psychometric information on the PANAS+CF in this study is the robust factorial invariance in the context of a longitudinal intervention study and discrimination of positive and negative affect from calm and focus states. These factorial invariance findings suggest that the PANAS+CF can be implemented in the context of frequent progress monitoring appropriate for schools. This should provide unique, efficient, and robustly important information for tacking student progress and evaluating educational activities. Therefore, the authors hope that the PANAS+CF will become widely used measure in the context of continued study of construct validity, psychometric stability, and generalization across diverse groups of students.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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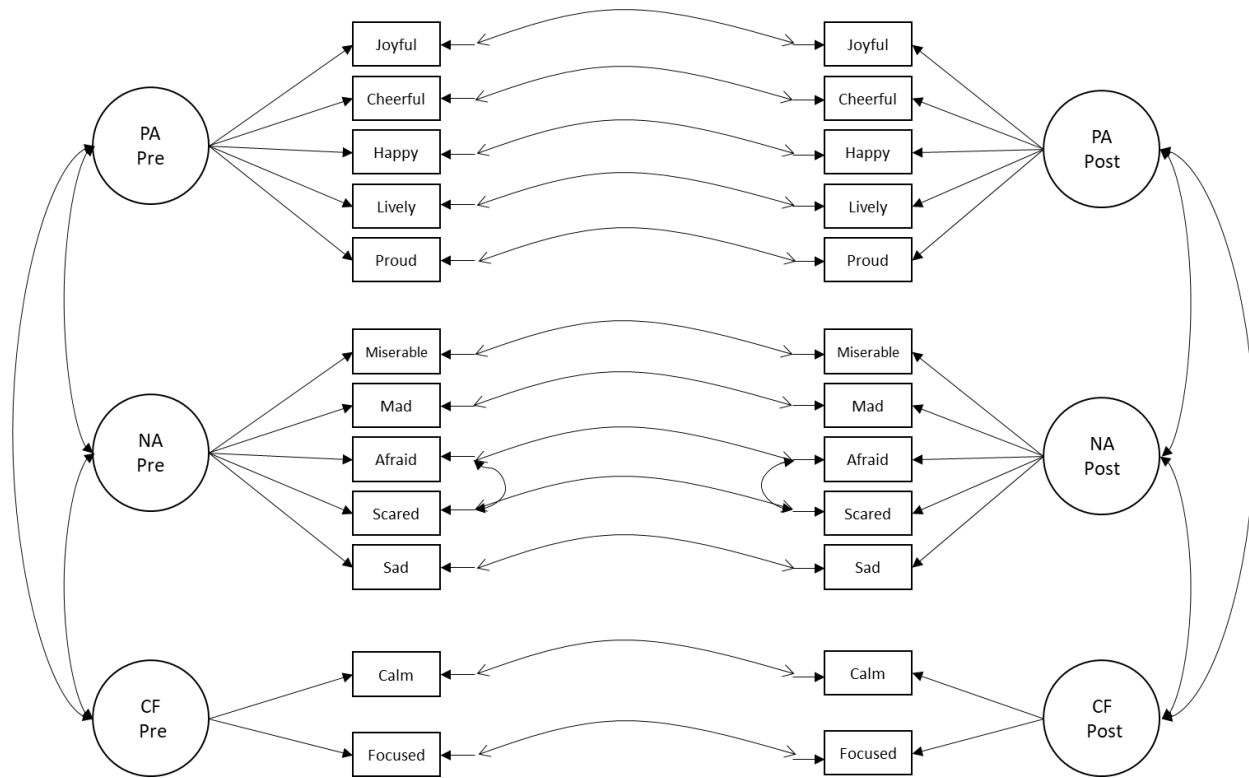
Figure 1. Longitudinal Configural Invariance Model of Positive and Negative Affect Schedule + Calm-Focus

(PANAS+CF). *Note.* PA = Positive Affect, NA = Negative Affect, and CF = Calm-Focus.

Appendix

Survey Instrument: PANAS+CF

Instructions: There are ten words below that describe different feelings and emotions. Read each item and then circle one number to indicate how much you feel that way **right now**.

	Not at all	A Little	Moderately	Quite A Bit	Extremely
Sad	0	1	2	3	4
Happy	0	1	2	3	4
Scared	0	1	2	3	4
Miserable	0	1	2	3	4
Cheerful	0	1	2	3	4
Proud	0	1	2	3	4
Afraid	0	1	2	3	4
Joyful	0	1	2	3	4
Mad	0	1	2	3	4
Lively	0	1	2	3	4
Calm	0	1	2	3	4
Focused	0	1	2	3	4

Correlation table for the Control condition

	Pre-Happy	Pre-Cheerful	Pre-Proud	Pre-Joyful	Pre-Lively	Pre-Sad	Pre-Scared	Pre-Miserable	Pre-Afraid	Pre-Mad	Pre-Calm	Pre-Focused	Post-Happy	Post-Cheerful	Post-Proud	Post-Joyful	Post-Lively	Post-Sad	Post-Scared	Post-Miserable	Post-Afraid	Post-Mad	Post-Calm	Post-Focused
Pre-Happy	1																							
Pre-Cheerful	.730**	1																						
Pre-Proud	.586**	.671**	1																					
Pre-Joyful	.717**	.916**	.656**	1																				
Pre-Lively	.481**	.579**	.479**	.582**	1																			
Pre-Sad	-0.093	-0.116	-0.108	-0.070	-0.185	1																		
Pre-Scared	-0.069	-0.046	0.048	-0.007	-0.042	.588**	1																	
Pre-Miserable	-.352**	-.293**	-.206*	-.255**	-.298**	.392**	.407**	1																
Pre-Afraid	0.080	0.020	0.106	0.043	-0.084	.273**	.671**	.261**	1															
Pre-Mad	-.210*	-0.154	-0.094	-0.149	-.226*	.631**	.604**	.601**	.372**	1														
Pre-Calm	.269**	.253*	.338**	.235*	0.129	-0.162	-0.101	-.304**	-0.083	-0.144	1													
Pre-Focused	.236*	.232*	.379**	.248*	.204*	-.214*	-0.074	-.314**	-0.073	-.211*	.743**	1												
Post-Happy	.747**	.703**	.570**	.712**	.420**	0.007	0.024	-.349**	0.085	-0.135	.270**	.209*	1											
Post-Cheerful	.681**	.869**	.655**	.821**	.500**	-0.032	0.071	-.229*	0.158	-0.097	0.179	0.160	.822**	1										
Post-Proud	.508**	.596**	.892**	.586**	.384**	-0.006	0.164	-0.095	.202*	0.039	.275**	.300**	.631**	.684**	1									
Post-Joyful	.666**	.849**	.658**	.860**	.578**	-0.059	0.079	-.205*	0.161	-0.082	0.177	0.158	.796**	.904**	.700**	1								
Post-Lively	.295**	.383**	.308**	.396**	.800**	-0.041	0.076	-0.125	-0.022	-0.104	0.050	0.105	.366**	.419**	.364**	.507**	1							
Post-Sad	0.012	-0.075	-0.078	-0.050	-0.143	.744**	.293**	.214*	0.106	.465**	-0.029	-0.129	-0.064	-0.080	-0.069	-0.097	-0.107	1						
Post-Scared	0.000	-0.006	0.102	0.010	-0.010	.298**	.646**	.221*	.558**	.340**	-0.024	-0.047	-0.035	0.015	0.110	-0.012	-0.027	.324**	1					
Post-Miserable	-.317**	-.278**	-.199*	-.277**	-.278**	.277**	.350**	.869**	.224*	.541**	-.195*	-.196*	-.451**	-.296**	-.199*	-.270**	-.219*	.248*	.314**	1				
Post-Afraid	0.061	0.046	0.104	0.023	-0.087	0.139	.457**	0.120	.790**	.233*	0.050	0.007	0.047	0.127	0.150	0.079	-0.087	0.189	.669**	0.189	1			
Post-Mad	-0.166	-0.068	-0.050	-0.093	-0.124	.487**	.496**	.499**	.289**	.812**	-0.083	-0.099	-.232*	-0.111	-0.031	-0.126	-0.072	.425**	.408**	.578**	.285**	1		
Post-Calm	.334**	.318**	.433**	.330**	0.163	-0.096	0.019	-.205*	0.057	-0.161	.607**	.377**	.488**	.386**	.503**	.412**	0.180	-0.173	-0.099	-.305**	0.036	-.315**	1	
Post-Focused	.295**	.268**	.446**	.282**	0.193	-0.106	0.064	-.202*	0.135	-0.180	.417**	.540**	.399**	.335**	.505**	.367**	.212*	-.236*	-0.118	-.301**	0.035	-.324**	.793**	1
Mean	2.52	2.01	1.39	2.18	1.75	0.25	0.19	0.44	0.23	0.29	2.20	2.21	2.73	2.20	1.56	2.19	1.69	0.23	0.16	0.39	0.18	0.24	2.81	2.79
Std. Deviation	0.95	1.20	1.24	1.13	1.14	0.50	0.41	0.80	0.46	0.57	1.10	1.13	0.98	1.16	1.31	1.16	1.20	0.45	0.34	0.86	0.41	0.55	1.14	1.15

*p < .05, ** p < .01

Correlation table for the PTK condition

	Pre-Happy	Pre-Cheerful	Pre-Proud	Pre-Joyful	Pre-Lively	Pre-Sad	Pre-Scared	Pre-Miserable	Pre-Afraid	Pre-Mad	Pre-Calm	Pre-Focused	Post-Happy	Post-Cheerful	Post-Proud	Post-Joyful	Post-Lively	Post-Sad	Post-Scared	Post-Miserable	Post-Afraid	Post-Mad	Post-Calm	Post-Focused
Pre-Happy	1																							
Pre-Cheerful	.785**	1																						
Pre-Proud	.634**	.741**	1																					
Pre-Joyful	.759**	.948**	.758**	1																				
Pre-Lively	.464**	.535**	.477**	.543**	1																			
Pre-Sad	-0.180	-0.103	-0.050	-0.109	-0.091	1																		
Pre-Scared	0.003	0.038	0.089	0.040	-0.007	.649**	1																	
Pre-Miserable	-.414**	-.325**	-0.185	-.305**	-.223*	.455**	.463**	1																
Pre-Afraid	0.101	0.136	.211*	0.148	-0.114	.496**	.722**	.289**	1															
Pre-Mad	-.243*	-.235*	-0.053	-.196*	-0.080	.616**	.640**	.623**	.485**	1														
Pre-Calm	.373**	.376**	.426**	.399**	.218*	-0.143	0.083	-.206*	0.125	-0.147	1													
Pre-Focused	.379**	.400**	.399**	.376**	.303**	-.207*	-0.032	-.306**	0.035	-.263**	.738**	1												
Post-Happy	.819**	.751**	.638**	.727**	.389**	-0.128	-0.006	-.380**	0.122	-0.189	.400**	.337**	1											
Post-Cheerful	.724**	.899**	.735**	.848**	.435**	-0.070	0.047	-.281**	0.171	-0.155	.368**	.346**	.828**	1										
Post-Proud	.551**	.700**	.911**	.710**	.430**	-0.017	0.068	-0.162	.195*	-0.009	.395**	.344**	.657**	.778**	1									
Post-Joyful	.731**	.905**	.732**	.881**	.477**	-0.070	0.050	-.305**	0.178	-0.160	.366**	.380**	.826**	.943**	.755**	1								
Post-Lively	.330**	.371**	.387**	.364**	.803**	-0.076	-0.009	-0.107	-0.092	0.005	.237*	.262**	.374**	.384**	.381**	.419**	1							
Post-Sad	-0.130	-0.108	-0.072	-0.120	-0.045	.871**	.648**	.382**	.475**	.572**	-0.028	-0.080	-.193*	-0.142	-0.086	-0.120	-0.111	1						
Post-Scared	0.025	0.035	0.060	0.030	0.029	.685**	.885**	.359**	.645**	.570**	0.089	0.033	-0.043	0.002	0.018	0.023	-0.022	.778**	1					
Post-Miserable	-.371**	-.284**	-.229*	-.274**	-0.184	.440**	.447**	.883**	.254**	.599**	-0.187	-.219*	-.426**	-.304**	-.213*	-.315**	-0.144	.488**	.463**	1				
Post-Afraid	0.125	0.160	.217*	0.138	-0.032	.471**	.660**	.225*	.836**	.405**	.201*	0.158	0.052	0.115	0.144	0.132	-0.045	.564**	.725**	.328**	1			
Post-Mad	-.272**	-.244*	-0.105	-.227*	-0.061	.621**	.503**	.574**	.361**	.810**	-0.111	-0.171	-.335**	-.243*	-0.121	-.247*	-0.058	.680**	.603**	.691**	.452**	1		
Post-Calm	.489**	.436**	.482**	.445**	0.159	-0.164	-0.068	-.347**	0.022	-.248*	.521**	.373**	.546**	.503**	.516**	.521**	0.174	-.233*	-0.151	-.441**	-0.034	-.421**	1	
Post-Focused	.509**	.450**	.512**	.438**	.209*	-.215*	-0.091	-.362**	0.035	-.265**	.391**	.579**	.520**	.512**	.510**	.536**	.231*	-.254*	-0.142	-.410**	-0.022	-.418**	.812**	1
Mean	2.42	1.99	1.38	2.07	1.66	0.30	0.17	0.52	0.24	0.34	2.24	2.12	2.51	2.00	1.53	2.07	1.61	0.30	0.17	0.55	0.25	0.46	2.87	2.78
Std. Deviation	1.16	1.25	1.39	1.31	1.16	0.66	0.48	0.90	0.66	0.70	1.19	1.22	1.19	1.33	1.45	1.32	1.26	0.66	0.51	0.98	0.64	0.81	1.19	1.24

$* \ p < .05, \ ** \ p < .01$

Correlation table for the Belly Breathing condition

	Pre-Happy	Pre-Cheerful	Pre-Proud	Pre-Joyful	Pre-Lively	Pre-Sad	Pre-Scared	Pre-Miserable	Pre-Afraid	Pre-Mad	Pre-Calm	Pre-Focused	Post-Happy	Post-Cheerful	Post-Proud	Post-Joyful	Post-Lively	Post-Sad	Post-Scared	Post-Miserable	Post-Afraid	Post-Mad	Post-Calm	Post-Focused
Pre-Happy	1																							
Pre-Cheerful	.785**	1																						
Pre-Proud	.609**	.699**	1																					
Pre-Joyful	.748**	.928**	.722**	1																				
Pre-Lively	.570**	.588**	.404**	.574**	1																			
Pre-Sad	-0.099	-0.012	-0.022	-0.022	0.015	1																		
Pre-Scared	0.096	.194*	.227*	0.185	0.116	.617**	1																	
Pre-Miserable	-.309**	-0.177	-0.101	-.249*	-0.189	.416**	.456**	1																
Pre-Afraid	0.189	.201*	.219*	.222*	0.160	.456**	.796**	.313**	1															
Pre-Mad	-0.186	-0.095	-0.044	-0.130	-0.073	.525**	.597**	.592**	.464**	1														
Pre-Calm	.355**	.299**	.458**	.364**	0.191	-0.094	0.023	-0.175	0.072	-.235*	1													
Pre-Focused	.411**	.378**	.481**	.481**	.255**	-0.053	0.062	-.225*	0.093	-.217*	.788**	1												
Post-Happy	.817**	.730**	.610**	.683**	.496**	-0.046	0.174	-.249*	.278**	-0.148	.385**	.399**	1											
Post-Cheerful	.733**	.895**	.671**	.856**	.535**	-0.024	.221*	-0.169	.290**	-0.145	.323**	.401**	.812**	1										
Post-Proud	.572**	.645**	.892**	.662**	.348**	-0.010	.296**	-0.094	.336**	-0.022	.444**	.458**	.644**	.726**	1									
Post-Joyful	.729**	.900**	.703**	.894**	.530**	-0.010	.228*	-.204*	.291**	-0.115	.359**	.421**	.810**	.946**	.750**	1								
Post-Lively	.422**	.396**	.314**	.410**	.806**	0.010	0.181	-0.121	0.183	-0.028	.238*	.261**	.443**	.446**	.340**	.446**	1							
Post-Sad	-0.049	-0.005	0.018	-0.009	0.026	.864**	.506**	.352**	.315**	.459**	-0.061	-0.023	-0.090	-0.089	-0.047	-0.055	0.005	1						
Post-Scared	0.133	.239*	0.191	.209*	0.135	.464**	.745**	.364**	.497**	.484**	0.087	0.102	0.075	0.184	.224*	0.177	.204*	.549**	1					
Post-Miserable	-.278**	-0.185	-0.109	-.211*	-0.175	.393**	.396**	.874**	.197*	.558**	-0.150	-0.175	-.336**	-.246*	-0.152	-.244*	-0.109	.412**	.378**	1				
Post-Afraid	0.150	0.143	.219*	0.173	0.089	.402**	.660**	.297**	.808**	.450**	0.153	0.175	0.138	0.189	.284**	0.186	0.106	.411**	.584**	.304**	1			
Post-Mad	-.194*	-0.113	-0.050	-0.132	-0.071	.548**	.524**	.610**	.314**	.899**	-0.143	-0.125	-.224*	-.208*	-0.082	-0.168	-0.014	.544**	.522**	.672**	.435**	1		
Post-Calm	.418**	.350**	.440**	.370**	0.152	-0.015	0.113	-0.182	.215*	-.247*	.640**	.494**	.438**	.454**	.546**	.455**	.206*	-0.083	0.046	-.298**	0.078	-.293**	1	
Post-Focused	.463**	.397**	.462**	.438**	.218*	-0.051	0.106	-.269**	.203*	-.225*	.412**	.622**	.477**	.486**	.542**	.495**	.246*	-0.119	0.009	-.365**	0.061	-.286**	.771**	1
Mean	2.38	2.02	1.32	2.06	1.74	0.33	0.19	0.47	0.21	0.37	2.19	2.13	2.52	2.03	1.57	2.11	1.64	0.25	0.18	0.48	0.21	0.36	2.74	2.71
Std. Deviation	1.15	1.23	1.30	1.22	1.14	0.55	0.41	0.87	0.47	0.70	1.22	1.15	1.21	1.28	1.45	1.29	1.21	0.51	0.42	0.92	0.53	0.72	1.21	1.24

*$p < .05$, ** $p < .01$

Correlation table for the Pause Buttons condition

	Pre-Happy	Pre-Cheerful	Pre-Proud	Pre-Joyful	Pre-Lively	Pre-Sad	Pre-Scared	Pre-Miserable	Pre-Afraid	Pre-Mad	Pre-Calm	Pre-Focused	Post-Happy	Post-Cheerful	Post-Proud	Post-Joyful	Post-Lively	Post-Sad	Post-Scared	Post-Miserable	Post-Afraid	Post-Mad	Post-Calm	Post-Focused
Pre-Happy	1																							
Pre-Cheerful	.767**	1																						
Pre-Proud	.621**	.738**	1																					
Pre-Joyful	.732**	.954**	.733**	1																				
Pre-Lively	.546**	.591**	.505**	.623**	1																			
Pre-Sad	-0.137	-0.051	-0.085	-0.018	-0.104	1																		
Pre-Scared	-0.089	0.007	0.095	0.010	0.009	.424**	1																	
Pre-Miserable	-.397**	-.309**	-0.160	-.312**	-.290**	.396**	.419**	1																
Pre-Afraid	-0.050	0.051	0.119	0.024	-0.006	.431**	.839**	.376**	1															
Pre-Mad	-.251*	-0.146	-0.024	-0.114	-0.091	.522**	.640**	.693**	.605**	1														
Pre-Calm	.433**	.387**	.460**	.420**	.316**	-0.063	0.010	-.254**	-0.024	-0.181	1													
Pre-Focused	.427**	.413**	.471**	.448**	.347**	-0.119	0.018	-.285**	0.015	-.207*	.803**	1												
Post-Happy	.847**	.692**	.637**	.672**	.508**	-0.117	0.062	-.299**	0.054	-0.157	.451**	.414**	1											
Post-Cheerful	.703**	.905**	.742**	.892**	.605**	-0.036	0.067	-.270**	0.105	-0.092	.430**	.427**	.793**	1										
Post-Proud	.558**	.676**	.935**	.676**	.479**	-0.027	.212*	-0.103	0.190	0.065	.392**	.394**	.671**	.750**	1									
Post-Joyful	.682**	.894**	.726**	.905**	.627**	-0.023	0.149	-.223*	0.131	-0.041	.414**	.423**	.766**	.937**	.753**	1								
Post-Lively	.414**	.416**	.422**	.452**	.824**	-0.119	0.040	-0.186	0.010	-0.050	.338**	.325**	.456**	.515**	.453**	.517**	1							
Post-Sad	-0.169	-0.079	-0.118	-0.050	-0.154	.870**	0.215	.347**	0.239	.397**	-0.094	-0.139	-.248*	-0.130	-0.138	-0.134	-0.189	1						
Post-Scared	-0.121	-0.021	0.055	-0.033	0.018	.395**	.840**	.411**	.719**	.538**	0.039	-0.034	-0.024	0.004	0.137	0.056	-0.009	.351**	1					
Post-Miserable	-.344**	-.254**	-0.153	-.263**	-.240*	.331**	.378**	.922**	.321**	.641**	-.232*	-.220*	-.323**	-.267**	-0.150	-.232*	-0.177	.356**	.428**	1				
Post-Afraid	-0.128	-0.010	0.049	-0.040	-0.016	.419**	.861**	.419**	.782**	.589**	0.001	-0.047	0.031	0.024	0.159	0.113	-0.058	.232*	.846**	.373**	1			
Post-Mad	-.311**	-0.173	-0.114	-0.162	-0.189	.510**	.376**	.703**	.450**	.759**	-0.180	-0.184	-.323**	-0.159	-0.126	-0.181	-0.120	.557**	.420**	.751**	.345**	1		
Post-Calm	.502**	.453**	.482**	.457**	.293**	-0.125	-0.009	-.335**	-0.048	-.222*	.656**	.516**	.591**	.534**	.537**	.540**	.324**	-.227*	-0.108	-.408**	-0.063	-.333**	1	
Post-Focused	.427**	.443**	.495**	.442**	.312**	-0.144	0.039	-.366**	-0.010	-.203*	.495**	.633**	.489**	.512**	.557**	.503**	.353**	-.223*	-0.093	-.396**	-0.069	-.359**	.811**	1
Mean	2.41	1.99	1.29	2.06	1.78	0.33	0.15	0.56	0.18	0.35	2.15	2.12	2.51	2.03	1.48	2.15	1.65	0.29	0.17	0.52	0.21	0.30	2.73	2.77
Std. Deviation	1.09	1.26	1.34	1.28	1.17	0.67	0.40	0.94	0.41	0.70	1.23	1.23	1.15	1.33	1.45	1.30	1.29	0.63	0.36	0.89	0.57	0.64	1.24	1.20

*$p < .05$, ** $p < .01$

Correlation table for the Cross Connect condition

	Pre-Happy	Pre-Cheerful	Pre-Proud	Pre-Joyful	Pre-Lively	Pre-Sad	Pre-Scared	Pre-Miserable	Pre-Afraid	Pre-Mad	Pre-Calm	Pre-Focused	Post-Happy	Post-Cheerful	Post-Proud	Post-Joyful	Post-Lively	Post-Sad	Post-Scared	Post-Miserable	Post-Afraid	Post-Mad	Post-Calm	Post-Focused
Pre-Happy	1																							
Pre-Cheerful	.761**	1																						
Pre-Proud	.592**	.719**	1																					
Pre-Joyful	.784**	.927**	.671**	1																				
Pre-Lively	.586**	.587**	.554**	.623**	1																			
Pre-Sad	0.007	0.012	-0.001	-0.006	-0.095	1																		
Pre-Scared	0.090	0.094	0.116	0.066	0.001	.654**	1																	
Pre-Miserable	-.331**	-.242*	-0.161	-.278**	-.254**	.377**	.321**	1																
Pre-Afraid	0.161	0.135	0.127	0.098	-0.058	.612**	.869**	.269**	1															
Pre-Mad	-0.070	-0.020	-0.019	-0.055	-0.121	.611**	.545**	.539**	.519**	1														
Pre-Calm	.357**	.250*	.432**	.294**	.251*	-0.165	-0.020	-.267**	0.008	-0.133	1													
Pre-Focused	.380**	.304**	.449**	.345**	.351**	-0.188	-0.046	-.286**	0.010	-0.182	.776**	1												
Post-Happy	.860**	.643**	.523**	.697**	.505**	0.000	0.068	-.354**	0.103	-0.088	.374**	.384**	1											
Post-Cheerful	.686**	.827**	.689**	.813**	.544**	0.002	0.056	-.242*	0.078	-0.050	.313**	.366**	.782**	1										
Post-Proud	.555**	.644**	.882**	.588**	.431**	0.030	0.126	-0.167	0.124	0.018	.330**	.379**	.584**	.751**	1									
Post-Joyful	.715**	.792**	.654**	.838**	.536**	0.016	0.072	-0.192	0.092	-0.008	.257*	.317**	.807**	.942**	.723**	1								
Post-Lively	.412**	.365**	.449**	.402**	.783**	-0.037	0.071	-0.136	0.026	-0.016	.253*	.303**	.407**	.475**	.433**	.480**	1							
Post-Sad	0.034	0.046	0.017	0.036	-0.049	.896**	.633**	.374**	.638**	.597**	-0.045	-0.062	-0.042	-0.064	-0.046	-0.052	-0.042	1						
Post-Scared	0.129	0.099	0.128	0.091	0.043	.637**	.887**	.346**	.818**	.578**	0.088	0.083	0.047	0.016	0.100	0.033	0.083	.712**	1					
Post-Miserable	-.249*	-0.163	-0.153	-0.183	-0.172	.469**	.477**	.851**	.434**	.576**	-0.161	-0.145	-.347**	-.265**	-.195*	-.213*	-0.104	.540**	.577**	1				
Post-Afraid	0.049	-0.010	0.039	-0.004	-0.033	.691**	.817**	.367**	.757**	.624**	-0.007	-0.013	0.061	0.049	0.126	0.083	0.024	.618**	.832**	.513**	1			
Post-Mad	-0.105	-0.083	-0.057	-0.109	-0.080	.591**	.506**	.518**	.483**	.867**	-0.094	-0.109	-.211*	-0.193	-0.115	-0.169	-0.019	.677**	.610**	.666**	.543**	1		
Post-Calm	.470**	.325**	.473**	.353**	.216*	-.212*	-0.116	-.341**	-0.074	-.242*	.554**	.452**	.535**	.454**	.532**	.461**	.235*	-.274**	-0.128	-.445**	-0.098	-.375**	1	
Post-Focused	.425**	.356**	.504**	.353**	.250*	-0.179	-0.098	-.344**	-0.056	-.245*	.379**	.576**	.483**	.474**	.572**	.473**	.242*	-.254**	-0.121	-.417**	-0.087	-.373**	.815**	1
Mean	2.39	1.98	1.32	2.00	1.70	0.34	0.22	0.50	0.23	0.40	2.14	2.12	2.47	1.97	1.45	2.03	1.63	0.29	0.22	0.52	0.28	0.42	2.69	2.64
Std. Deviation	1.11	1.23	1.33	1.22	1.15	0.66	0.49	0.84	0.50	0.79	1.24	1.23	1.21	1.25	1.44	1.27	1.27	0.66	0.60	0.94	0.71	0.84	1.28	1.27

*$p < .05$, ** $p < .01$

Correlation table for the Mindful Minute condition

	Pre-Happy	Pre-Cheerful	Pre-Proud	Pre-Joyful	Pre-Lively	Pre-Sad	Pre-Scared	Pre-Miserable	Pre-Afraid	Pre-Mad	Pre-Calm	Pre-Focused	Post-Happy	Post-Cheerful	Post-Proud	Post-Joyful	Post-Lively	Post-Sad	Post-Scared	Post-Miserable	Post-Afraid	Post-Mad	Post-Calm	Post-Focused
Pre-Happy	1																							
Pre-Cheerful	.745**	1																						
Pre-Proud	.604**	.666**	1																					
Pre-Joyful	.750**	.864**	.685**	1																				
Pre-Lively	.449**	.536**	.369**	.576**	1																			
Pre-Sad	-0.127	-0.083	0.072	-0.077	-0.124	1																		
Pre-Scared	0.041	0.115	.202*	0.026	0.036	.835**	1																	
Pre-Miserable	-.421**	-.254**	-0.080	-.266**	-.263**	.575**	.483**	1																
Pre-Afraid	0.025	0.095	0.166	0.018	0.044	.817**	.933**	.480**	1															
Pre-Mad	-.253**	-0.149	0.061	-0.145	-0.142	.712**	.618**	.750**	.580**	1														
Pre-Calm	.271**	0.182	.321**	.216*	0.052	-0.033	0.089	-0.111	0.067	-0.084	1													
Pre-Focused	.268**	.216*	.383**	.231*	0.177	-0.028	0.128	-0.110	0.114	-0.065	.797**	1												
Post-Happy	.840**	.651**	.510**	.612**	.402**	-0.058	0.081	-.316**	0.095	-0.145	.231*	.229*	1											
Post-Cheerful	.688**	.868**	.637**	.793**	.469**	-0.002	0.165	-0.187	0.161	-0.081	0.178	0.192	.769**	1										
Post-Proud	.574**	.641**	.877**	.617**	.301**	0.102	.248*	-0.023	.241*	0.083	.302**	.346**	.592**	.740**	1									
Post-Joyful	.693**	.832**	.647**	.841**	.498**	0.003	0.151	-0.170	0.153	-0.061	0.163	0.193	.771**	.938**	.731**	1								
Post-Lively	.228*	.349**	.237*	.330**	.759**	-0.031	0.059	-0.102	0.081	-0.011	0.099	0.173	.339**	.357**	.218*	.393**	1							
Post-Sad	-0.107	-0.063	0.086	-0.005	-0.033	.856**	.716**	.512**	.646**	.629**	-0.011	0.002	-0.145	-0.079	0.024	-0.065	0.072	1						
Post-Scared	-0.016	0.084	0.123	0.024	0.043	.748**	.884**	.458**	.816**	.604**	0.064	0.111	-0.005	0.070	0.136	0.067	0.082	.752**	1					
Post-Miserable	-.449**	-.259**	-0.119	-.227*	-.235*	.494**	.401**	.876**	.372**	.687**	-0.091	-0.056	-.430**	-.279**	-0.145	-.244*	-0.102	.552**	.473**	1				
Post-Afraid	-0.016	0.057	0.101	-0.011	0.040	.705**	.843**	.464**	.903**	.588**	0.051	0.110	0.044	0.124	0.187	0.087	0.029	.601**	.804**	.414**	1			
Post-Mad	-.282**	-0.157	-0.003	-0.128	-0.097	.584**	.489**	.607**	.455**	.829**	-0.100	-0.068	-.267**	-0.172	-0.044	-0.162	0.036	.667**	.604**	.691**	.544**	1		
Post-Calm	.464**	.366**	.435**	.364**	0.175	-0.055	0.063	-.250*	0.094	-0.159	.532**	.400**	.496**	.456**	.501**	.449**	0.162	-0.191	-0.078	-.403**	-0.013	-.318**	1	
Post-Focused	.457**	.421**	.462**	.364**	.204*	-0.044	0.101	-.216*	0.133	-0.148	.410**	.534**	.482**	.482**	.524**	.449**	.195*	-0.173	-0.022	-.343**	0.054	-.284**	.829**	1
Mean	2.54	2.06	1.50	2.19	1.79	0.23	0.22	0.48	0.19	0.33	2.17	2.17	2.64	2.09	1.63	2.17	1.56	0.23	0.21	0.50	0.20	0.39	2.86	2.73
Std. Deviation	1.05	1.26	1.36	1.23	1.17	0.61	0.59	0.90	0.57	0.73	1.25	1.21	1.17	1.34	1.44	1.32	1.26	0.57	0.58	0.98	0.60	0.82	1.22	1.29

*$p < .05$, ** $p < .01$