

**Electronic Supplement A***Codebook***Content**

Internal Data

Pretest Data

Experience Sampling Data

**Internal Data**

| Variable name | Construct                  | Item / Description                                                                                                                                                                                                                                                                                                                                                                 | Possible values                                             |
|---------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| SCHOOL        | School                     | numbered schools                                                                                                                                                                                                                                                                                                                                                                   | 1 - 2                                                       |
| CLASS         | class                      | numbered classes                                                                                                                                                                                                                                                                                                                                                                   | 1 - 7                                                       |
| CL-Nr         | number in the class        | numbered participants in class (movisens)                                                                                                                                                                                                                                                                                                                                          | 1 - 25                                                      |
| P-ID          | Participant ID             | numbered participants in sample                                                                                                                                                                                                                                                                                                                                                    | 1 - 111                                                     |
| T-ID          | Trigger-ID                 | numbered triggers in sample                                                                                                                                                                                                                                                                                                                                                        | 1 - 2057                                                    |
| T-FIX         | Fixed Time                 | Time preset in the app at which the signal sounded in the respective lesson                                                                                                                                                                                                                                                                                                        | 07:00 - 16:00                                               |
| T-date        | Date of trigger            | Examination day                                                                                                                                                                                                                                                                                                                                                                    | JJJJ-MM-DD                                                  |
| T-time        | Time of trigger            | Time of investigation                                                                                                                                                                                                                                                                                                                                                              | HH-MM-SS                                                    |
| T-cnt         | Trigger-counter            | Trigger counter in movisens app                                                                                                                                                                                                                                                                                                                                                    | 1 - 21                                                      |
| Form          | Type of data collection    | Content - One-time collection of all socio-demographic and personality-related data on the first day of the examination<br>ESM - Multiple measures per day of situational data on experiences during lessons on five school days<br>Missing - unanswered questions or missed quizzes due to absence or school-related requirements (e.g. class tests) where the tablets were muted | Content, ESM, Missing                                       |
| Frm-S-T       | Form start time            | Time at which the respondent began answering the questions                                                                                                                                                                                                                                                                                                                         | HH-MM-SS                                                    |
| Frm-F-T       | Form finish time           | Time at which the respondent finished answering the questions                                                                                                                                                                                                                                                                                                                      | HH-MM-SS                                                    |
| Frm-R-T       | Form required time         | Time required to complete the form                                                                                                                                                                                                                                                                                                                                                 | HH-MM-SS                                                    |
| T_Class       | shared classroom situation | Trigger in Class                                                                                                                                                                                                                                                                                                                                                                   | Class 1 (101-120), Class 2 (201-220), ... Class 7 (701-720) |
| Domain        | Teaching domain            | 0 language, 1 science                                                                                                                                                                                                                                                                                                                                                              |                                                             |
| Subject       | Subject                    | D-0, En-1, Fr_Ru-2, Ma-3, Ch-4, Ph-5, Bio-6                                                                                                                                                                                                                                                                                                                                        |                                                             |

**Pretest Data Students – Self-report**

| Variable name | Construct                  | Item / Description                                                                    | Possible values                                                                                                                   |
|---------------|----------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| AGE           | Participant's age in years | Wie alt bist Du?                                                                      | 14 - 16                                                                                                                           |
| GEN           | Participant's gender       | Bist Du ein Junge oder ein Mädchen?                                                   | 1: male; 2: female; 3: divers - later transformed to 0-male, 1 female                                                             |
| WELLB         | Well-being at school       | Wie gefällt es dir derzeit in der Schule?                                             | 1: Es gefällt mir überhaupt nicht; 2: Es gefällt mir nicht so gut; 3: Es gefällt mir einigermaßen gut; 4: Es gefällt mir sehr gut |
| STRESS        | stress at school           | Wie stark fühlst du dich durch das belastet, was in der Schule von dir verlangt wird? | 1: überhaupt nicht; 2: etwas; 3: einigermaßen stark; 4: sehr stark                                                                |
| MRK-M         | Mark in mathematics        | Welche Zeugnisnote hattest du am Ende des letzten Schuljahres im Fach Mathematik?     | 1 – 6                                                                                                                             |
| MRK-G         | Mark in german language    | Welche Zeugnisnote hattest du am Ende des letzten Schuljahres im Fach Deutsch?        | 1 – 6                                                                                                                             |

**Experience-Sampling-Data**

Note. The items are listed in the order in which they were presented to the students on the tablet.

| Variable name | Construct                              | Item / Description                                                                              | Translation                                                      | Possible values                                                                                                              |
|---------------|----------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| BORE          | Boredom                                | Ich fühlte mich gerade ...nicht gelangweilt - gelangweilt                                       | I just felt ...not bored - bored                                 | 0-100                                                                                                                        |
| N-Aut         | Unsatisfied Need for Autonomy          | Mir fehlte, dass ich die Aufträge im Unterricht auf meine eigene Art und Weise bearbeiten kann. | I missed being able to work on the tasks in class in my own way. | 1: trifft überhaupt nicht zu; 2: trifft eher nicht zu; 3: trifft teilweise zu; 4: trifft eher zu; 5: trifft voll und ganz zu |
| N-Rel         | Unsatisfied Need for Relatedness       | Mir fehlte, dass ich mich mit Anderen verbunden fühle.                                          | I missed feeling connected with others.                          |                                                                                                                              |
| N-Comp        | Unsatisfied Need for Competence        | Mir fehlte, dass ich mich kompetent fühle.                                                      | I missed feeling competent.                                      |                                                                                                                              |
| N-Mean        | Unsatisfied Need for Meaning           | Mir fehlte, dass ich etwas mache, was für mich einen tieferen Sinn hat.                         | I missed doing something that has a deeper meaning for me.       |                                                                                                                              |
| N-Stim        | Unsatisfied Need for Stimulation       | Mir fehlte, dass ich etwas Neues und Spannendes erlebe.                                         | I missed experiencing something new and exciting.                |                                                                                                                              |
| N-Self        | Unsatisfied Need for Self-Esteem       | Mir fehlte, dass ich zufrieden mit mir selbst bin.                                              | I missed being satisfied with myself.                            |                                                                                                                              |
| N-Infl        | Unsatisfied Need for Influence         | Mir fehlte, dass ich Einfluss auf andere Menschen nehmen kann.                                  | I missed being able to influence other people.                   |                                                                                                                              |
| N-Phys        | Unsatisfied Need for Physical thriving | Mir fehlte, dass ich mich bewegen kann.                                                         | I missed being able to move.                                     |                                                                                                                              |
| N-Lux         | Unsatisfied Need for Luxury/Aesthetic  | Mir fehlte, dass ich etwas Schönes um mich haben kann.                                          | I missed having something beautiful around me.                   |                                                                                                                              |
| N-Sec         | Unsatisfied Need for Security          | Mir fehlte, dass ich strukturiert und vorhersehbar arbeiten kann.                               | I missed being able to work in a structured and predictable way. |                                                                                                                              |

**Electronic Supplement B***Overview of the Multi-Level Analyses Carried Out*

| Output-File                                                   | Model                                                                            | Description                                                                                                                                                                                           |
|---------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mptext_00_basic_descriptive statistics                        | Basic Analysis                                                                   | no consideration of the 2-level structure                                                                                                                                                             |
| mptext_00_ols_regression                                      | Simple Regression model                                                          | no consideration of the 2-level structure                                                                                                                                                             |
| mptext_01_twolevelbasic_icc                                   | Two Level Basic Analysis                                                         | ICC calculation                                                                                                                                                                                       |
| mptext_02_intercept_only                                      | Intercept Only Model (Nullmodell)                                                | decomposition into variance sources                                                                                                                                                                   |
| mptext_03_means_as_outcome                                    | Means-as-Outcomes-Model                                                          | focus on level 2 - prediction of momentary boredom in class by gender, empty model for level 1                                                                                                        |
| mptext_04_random_intercept_model_groupmean                    | Random Intercept Model                                                           | focus on level 1 - prediction of momentary boredom in class by domain (0-language, 1-science), and currently unsatisfied psychological needs (groupmean), controlled for clustered data on two levels |
| mptext_05_random-intercept_full_model                         | Random Intercept Model                                                           | full model for testing the predictive contributions of the unsatisfied needs on boredom decomposed between level 1 and 2                                                                              |
| mptext_06_random coefficient modell without level 2 predictor | Random-Coefficient-Regressionsanalysis                                           | Random Intercept + Random Slope (Does the effect of currently unsatisfied needs on momentary boredom in class vary between individuals?)                                                              |
| mptext_07_cross-level-interaktion                             | Multilevel-Regression-Analysis (Random Slope Model) with Cross-Level-Interaction | Random Intercept + Random Slope + level-2-predictor gender + interaction with unsatisfied needs (Does the effect of currently unsatisfied needs on momentary boredom in class depend on gender?)      |

**Electronic Supplement C***Overview of the Number of Study Participants, ESM Observations, Missing and Exclusions*

| School | Class | Number of students per class | Maximum of possible measures per student | ESM-Observations per class |                       |                      |                                  |                                    |                    |                                  |
|--------|-------|------------------------------|------------------------------------------|----------------------------|-----------------------|----------------------|----------------------------------|------------------------------------|--------------------|----------------------------------|
|        |       |                              |                                          | Total planned measures     | Realized ESM-measures | Missing ESM measures | Compliance rate <sup>a</sup> (%) | Excluded ESM-measures <sup>b</sup> | Valid ESM-measures | Retention rates <sup>c</sup> (%) |
| 1      | 1     | 15                           | 19                                       | 285                        | 246                   | 39                   | 86.3                             | 31                                 | 215                | 75.4                             |
| 1      | 2     | 22                           | 19                                       | 418                        | 349                   | 69                   | 83.5                             | 39                                 | 310                | 74.2                             |
| 1      | 3     | 14                           | 18                                       | 252                        | 209                   | 43                   | 82.9                             | 9                                  | 200                | 79.4                             |
| 1      | 4     | 6                            | 19                                       | 114                        | 102                   | 12                   | 89.5                             | 49                                 | 53                 | 46.5                             |
| 2      | 5     | 21                           | 18                                       | 378                        | 334                   | 44                   | 88.4                             | 20                                 | 314                | 83.1                             |
| 2      | 6     | 17                           | 18                                       | 306                        | 266                   | 40                   | 86.9                             | 13                                 | 253                | 82.7                             |
| 2      | 7     | 16                           | 19                                       | 304                        | 206                   | 98                   | 67.8                             | 18                                 | 188                | 61.8                             |
| N      |       | 111                          | 130                                      | 2,057                      | 1,712                 | 345                  | 83.2                             | 179                                | 1,533              | 74.5                             |

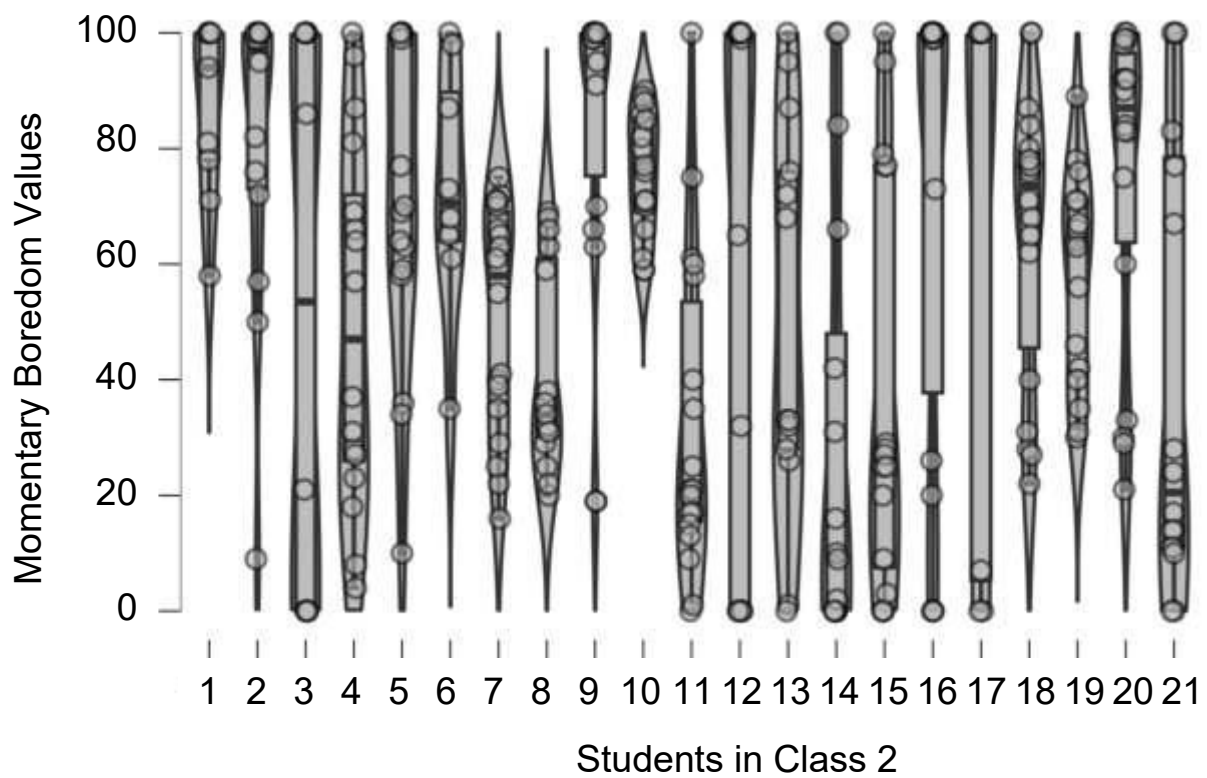
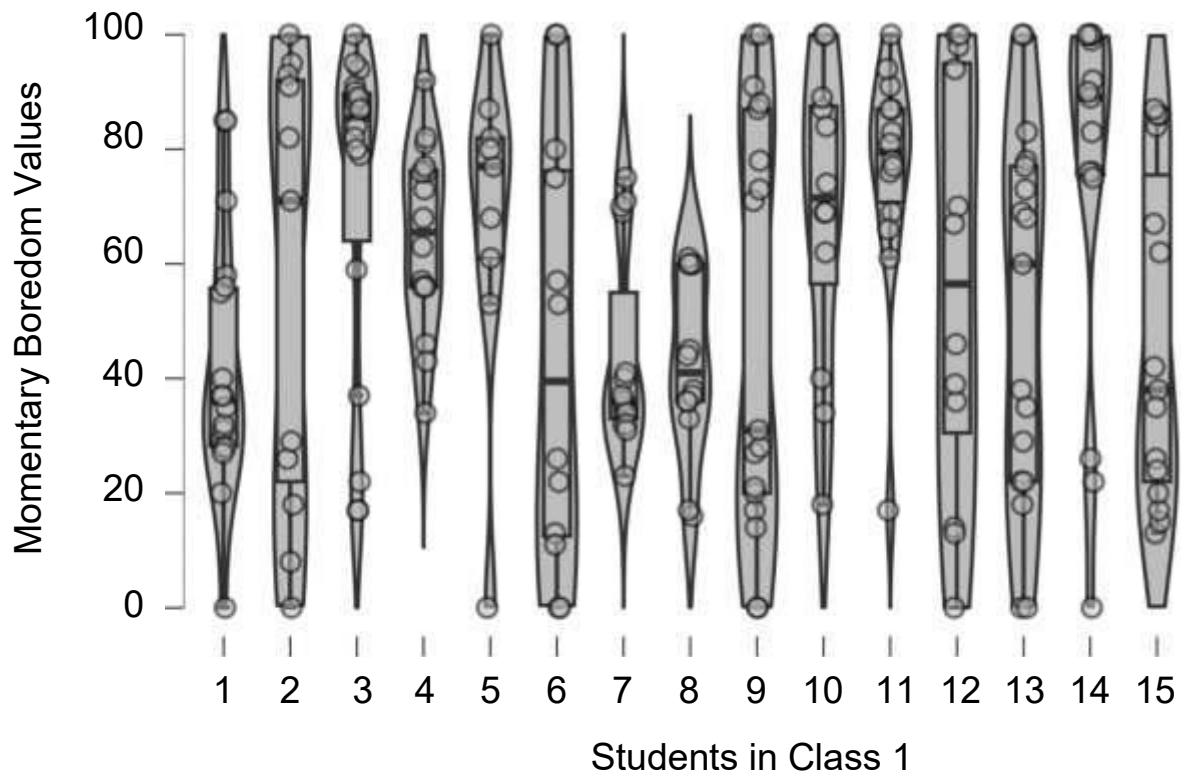
*Note.* <sup>a</sup> ratio of the number of measures actually carried out by the participants to the theoretical maximum number of measures permitted by the protocol

<sup>b</sup> careless responders according to pre-registered rules and exclusion due to data protection regulations on anonymity

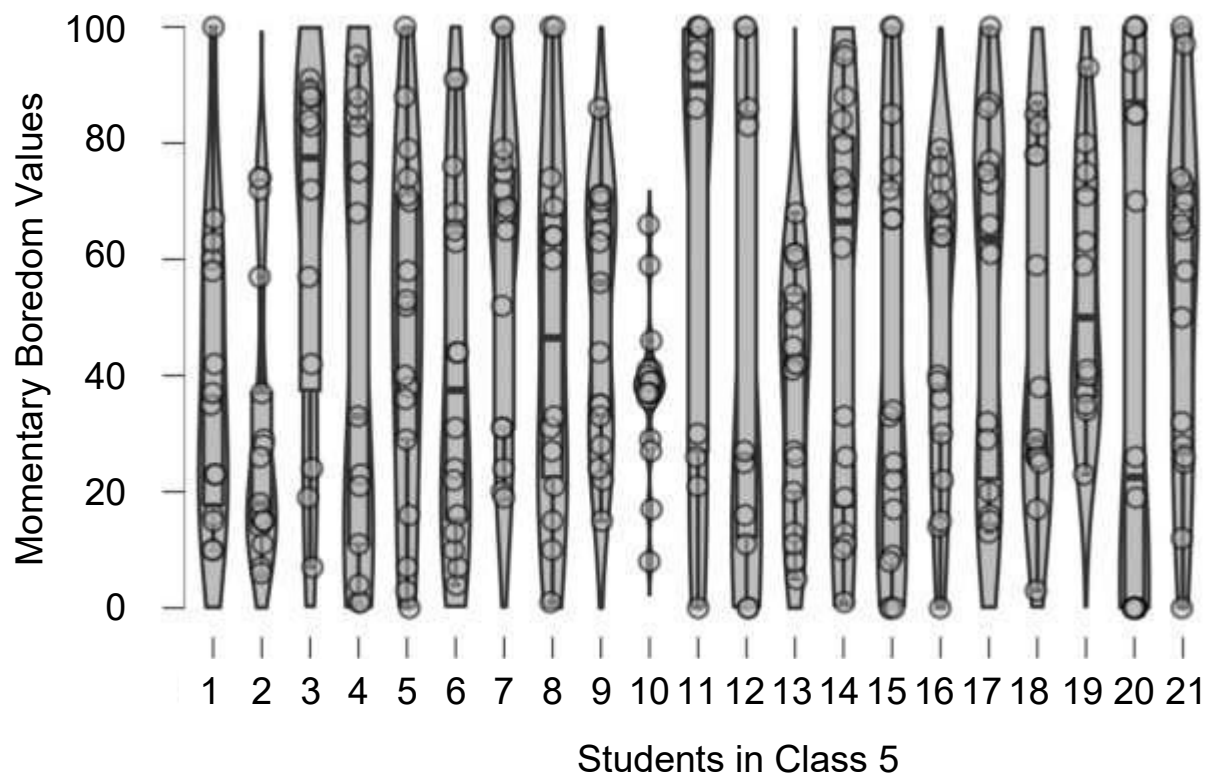
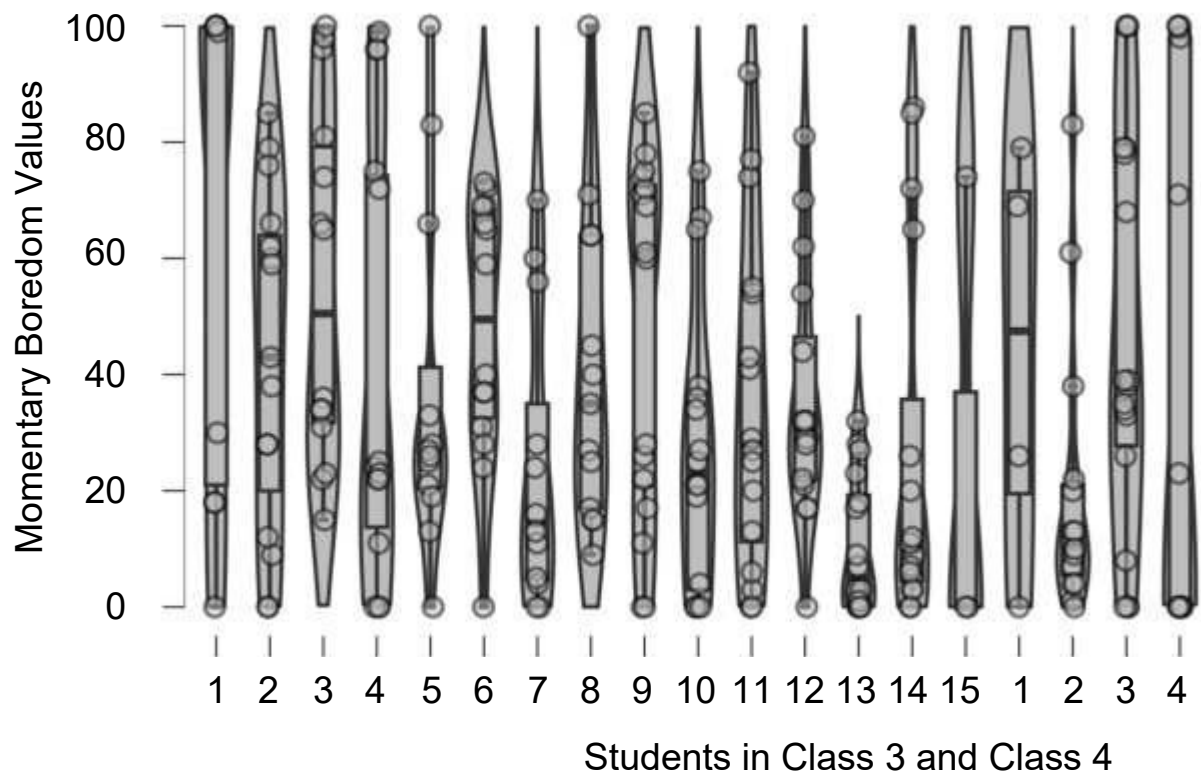
<sup>c</sup> proportion of valid observations included in the analysis in relation to the maximum number of observations over the 5 days of the ESM study

**Electronic Supplement D**

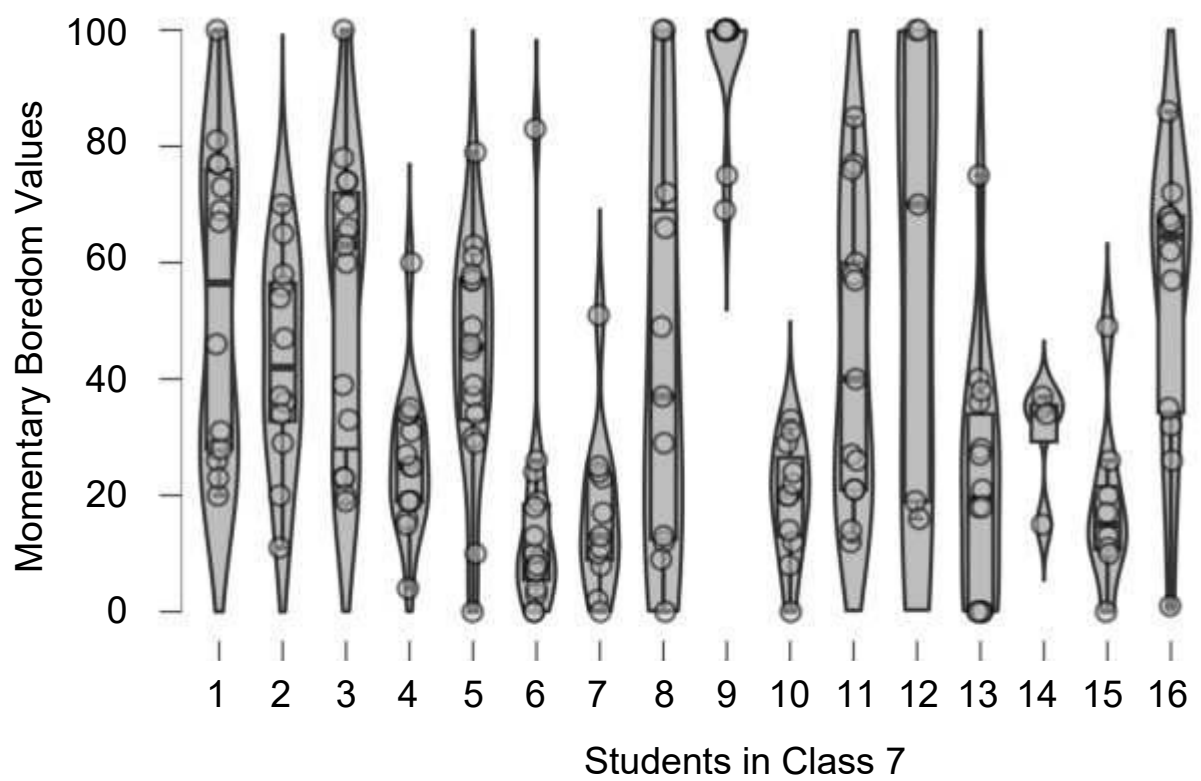
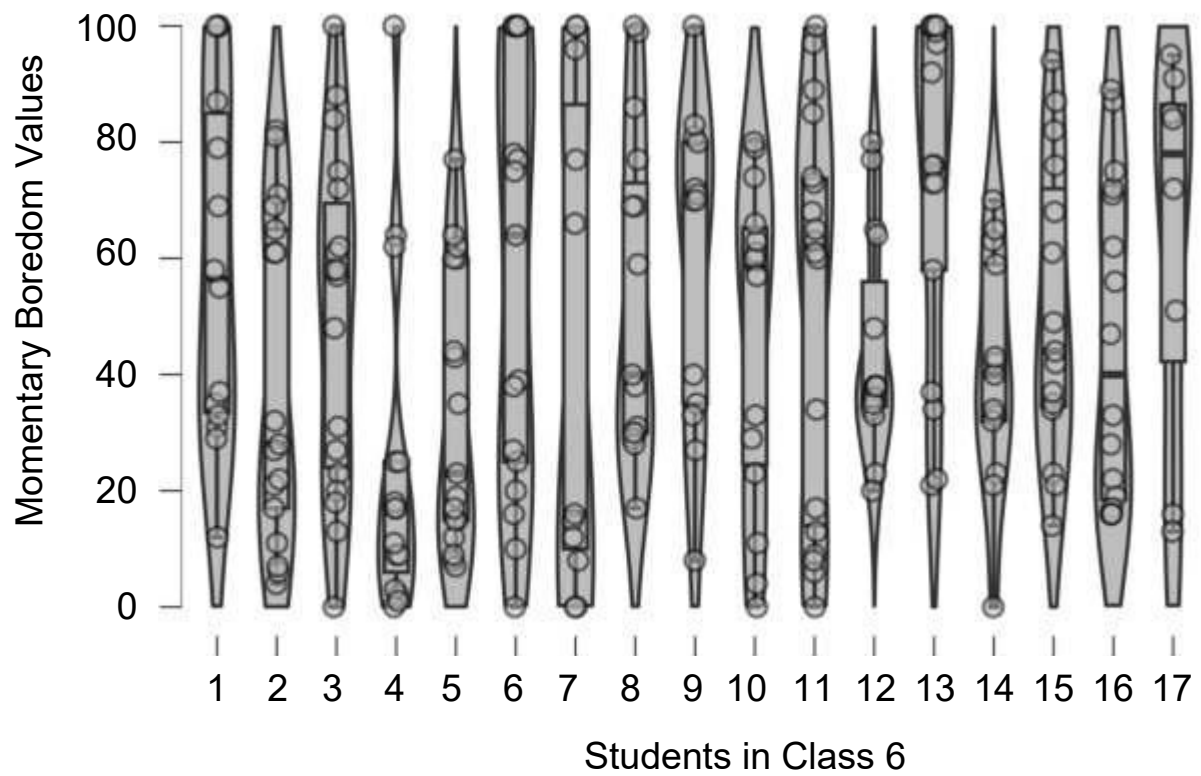
*Distribution of Momentary Boredom Values for each Student in a Class*



## BOREDOM AND PSYCHOLOGICAL NEEDS IN THE CLASSROOM

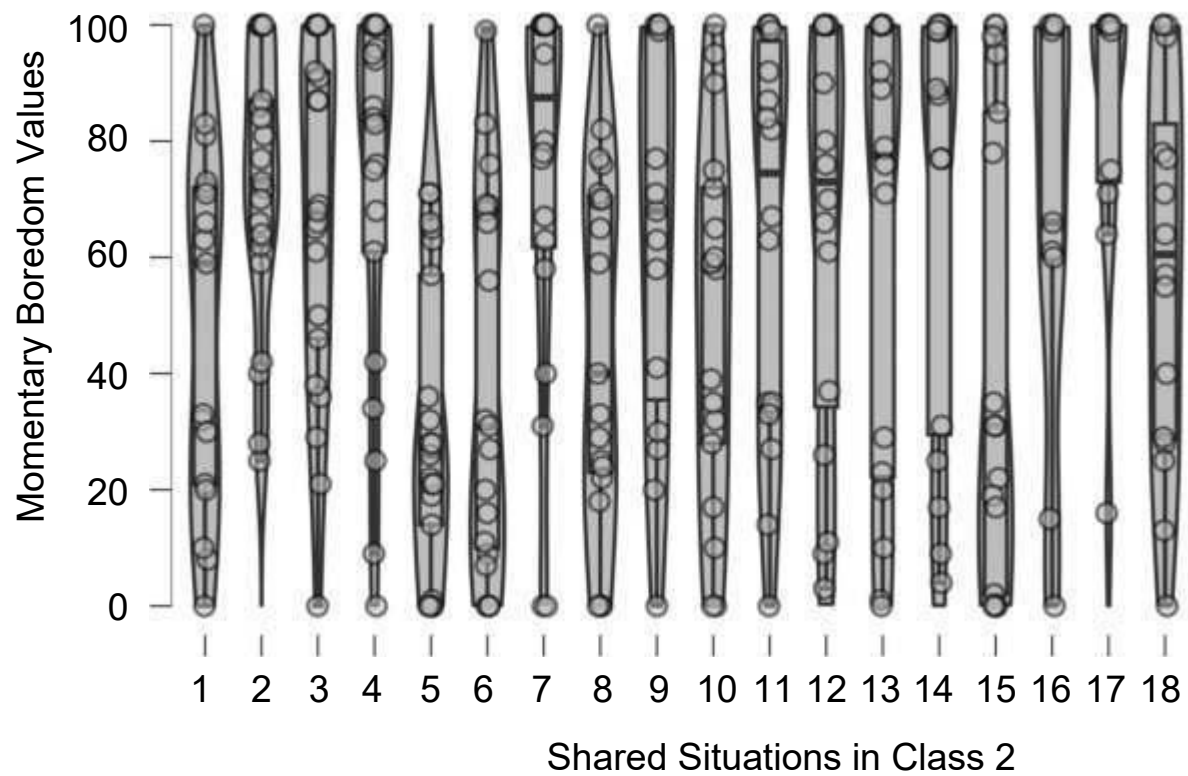
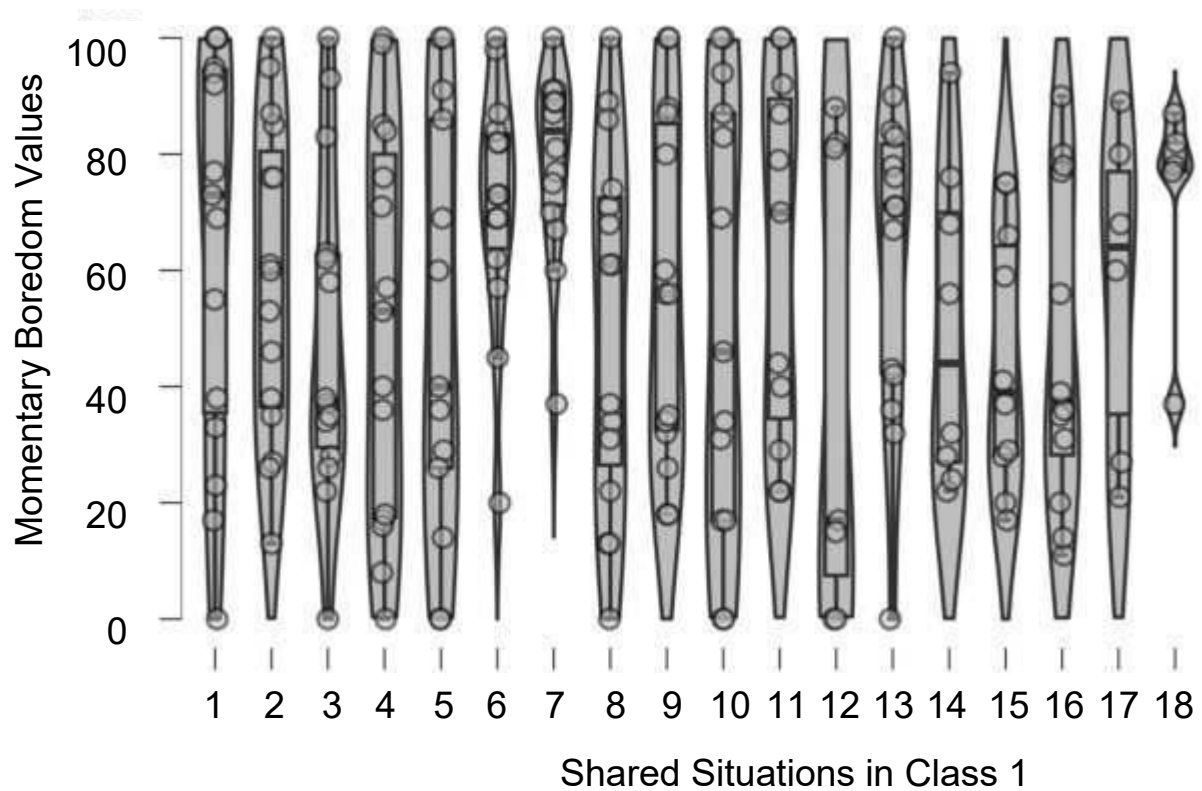


## BOREDOM AND PSYCHOLOGICAL NEEDS IN THE CLASSROOM



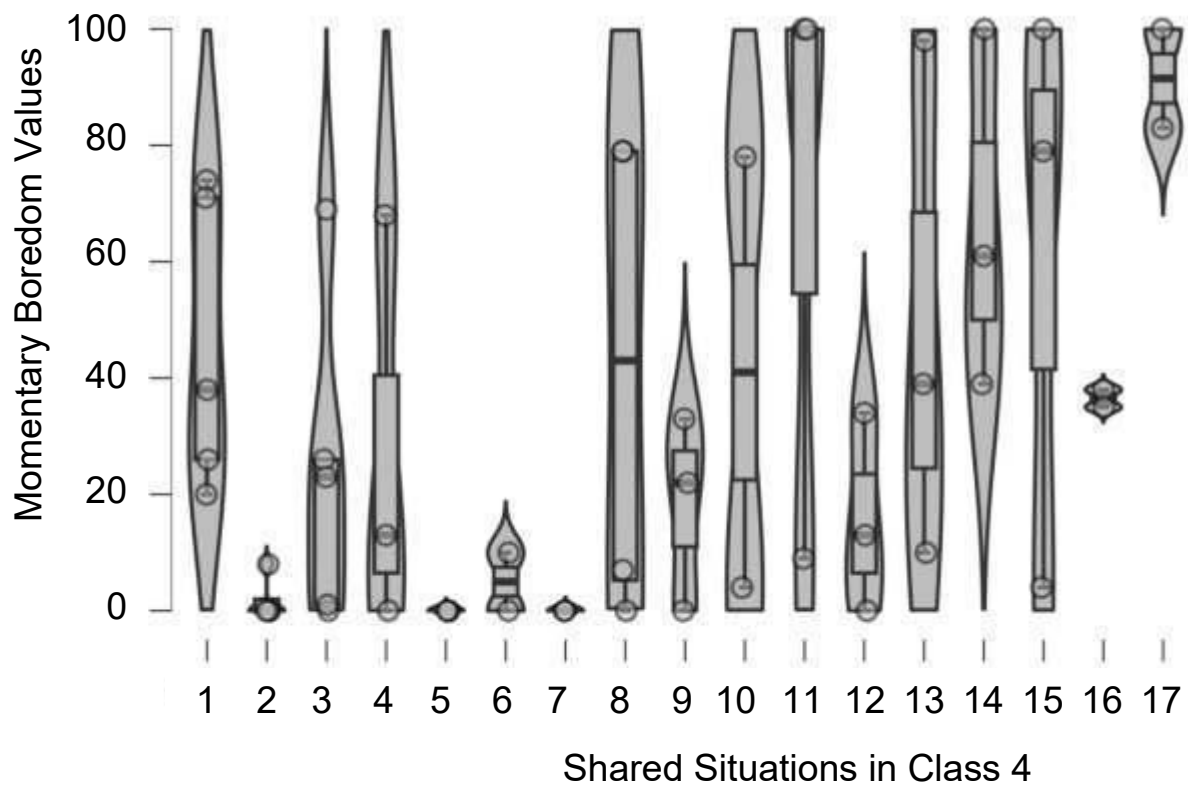
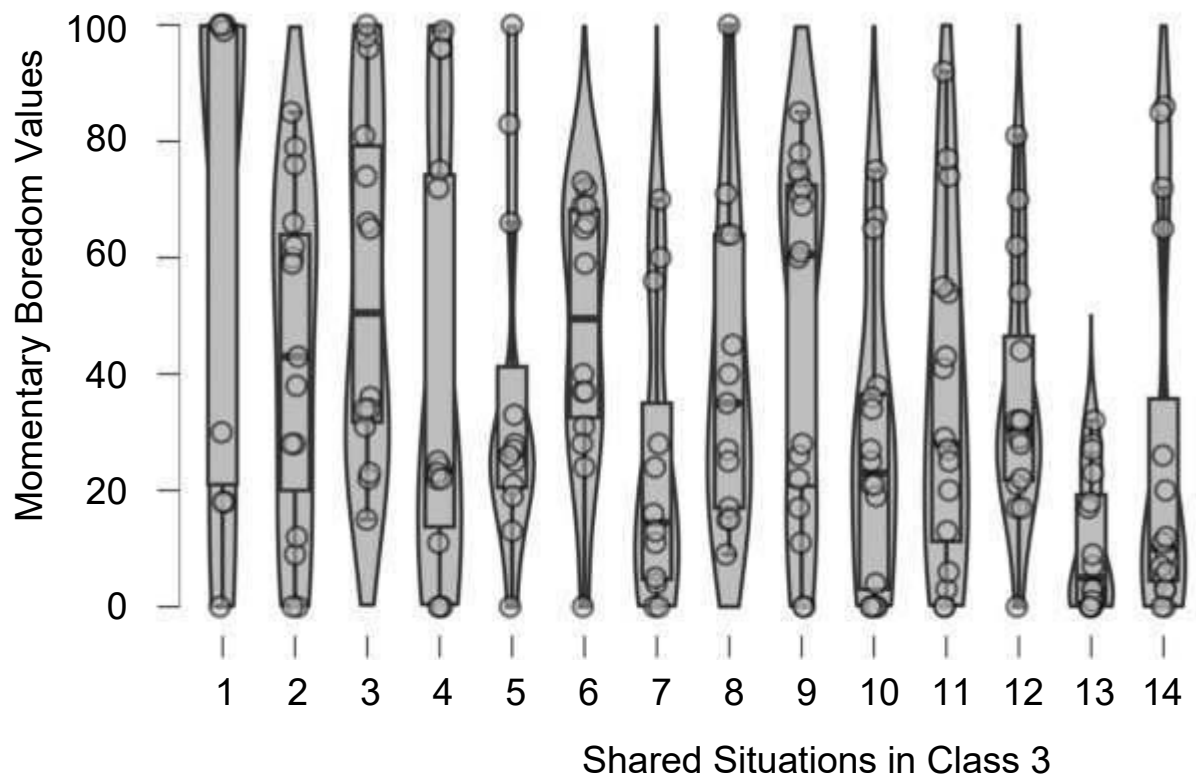
**Electronic Supplement E**

Distribution of Momentary Boredom Values for Shared Situations in a Class

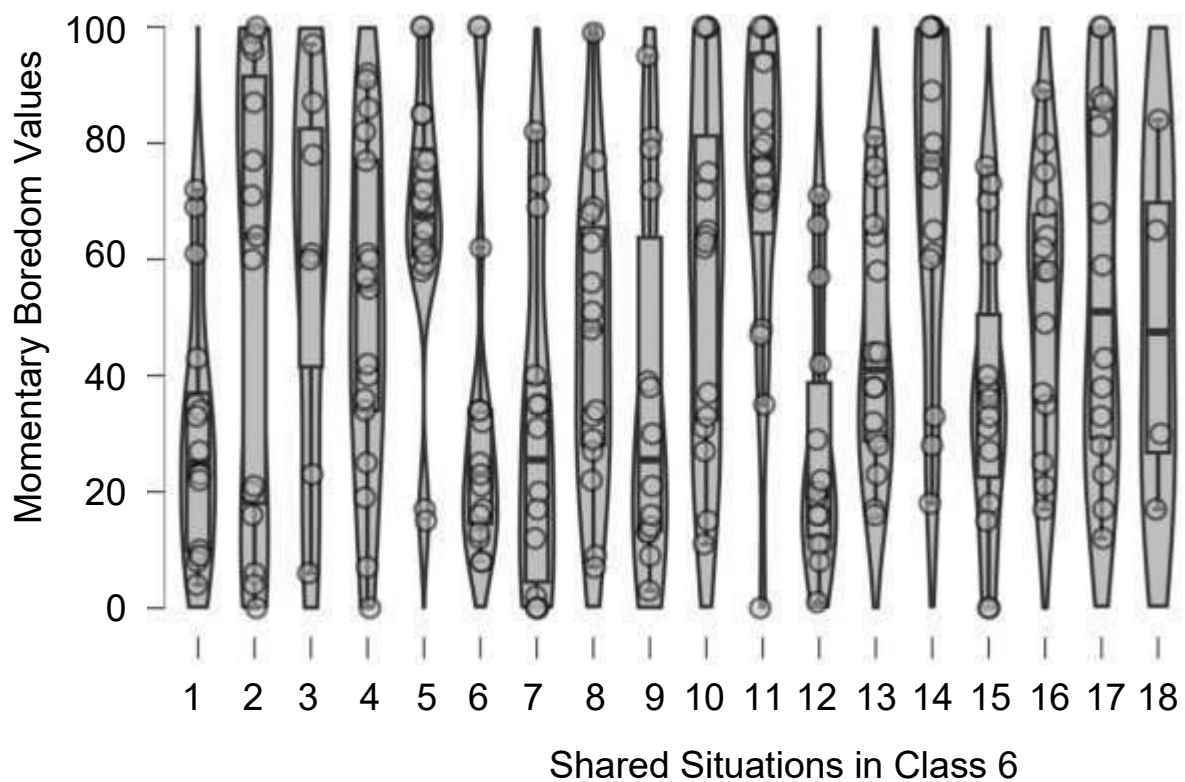
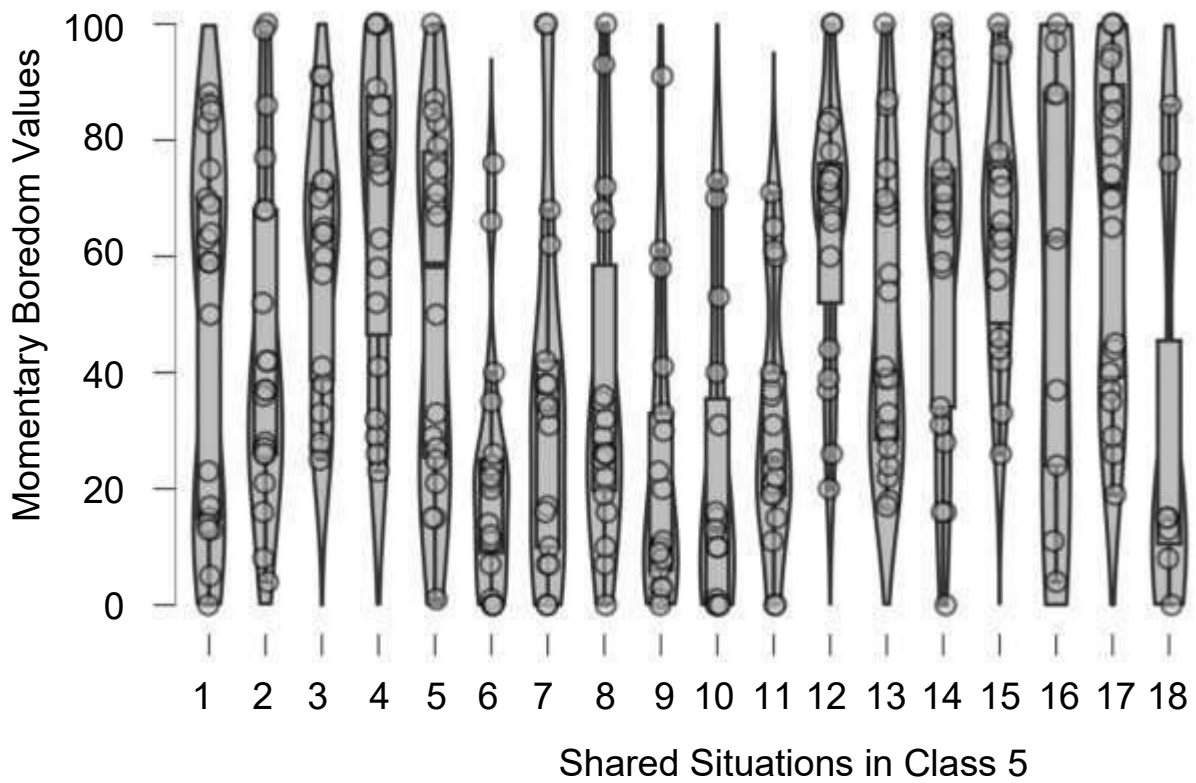




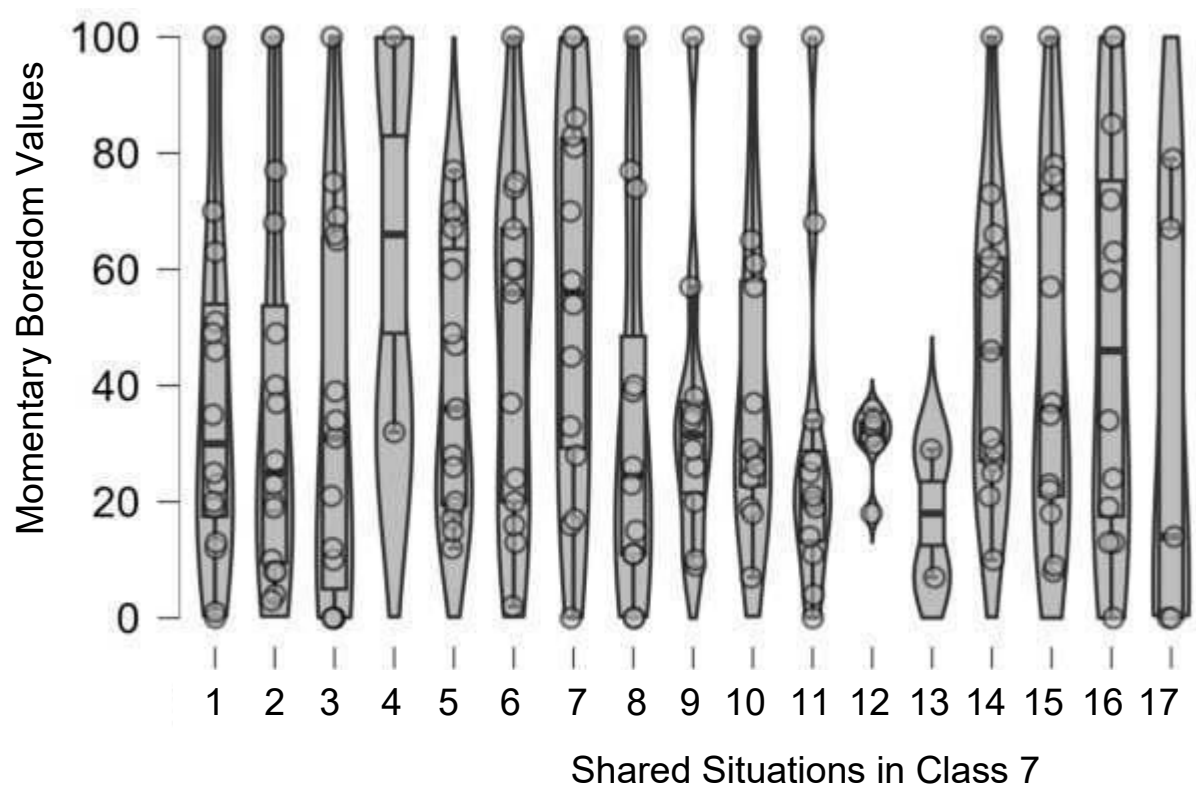
## BOREDOM AND PSYCHOLOGICAL NEEDS IN THE CLASSROOM



## BOREDOM AND PSYCHOLOGICAL NEEDS IN THE CLASSROOM



## BOREDOM AND PSYCHOLOGICAL NEEDS IN THE CLASSROOM



Address of the sender

...

BLINDED FOR PEER REVIEW

**Request for data utilisation or secondary analysis of a data set  
(Antrag auf Datennutzung bzw. Sekundäranalyse eines Datensatzes)**

I hereby submit the application for the use of research data (approval BLINDED FOR PEER REVIEW) for the following purpose:

(Hiermit stelle ich den Antrag auf Nutzung der Daten aus dem Genehmigungsverfahren WU BLINDED FOR PEER REVIEW zu folgendem Zweck:)

---

(please describe)

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Date, signature