**Supplementary Material for Internalizing Symptoms, Wellbeing and Correlates in Adolescence: A Multiverse Exploration via Cross-lagged Panel Network Models**

**Item Selection**

The complete battery of items used in the main study can be seen here <https://www.corc.uk.net/media/1517/blf17_20-second-school-measuresbl-17-03-17b.pdf>

All items were considered based on conceptual relevance and validity. Next items that were considered to be relevant and equally valid were checked for similarity. Where these were derived from the same scale and had similar content, factor analysis was performed to ensure selected items (based on content) had high factor loadings. Where it was not appropriate to perform factor analysis (i.e., items were expected to have unique variance for methodological reasons such as due to reverse wording or being from a different scales), items that were considered to be equally valid were both retained and used as alternatives in the multiverse design. For instance, though there were multiple school, peer and home support items (in the SRS), those selected for analysis were not chosen arbitrarily, but on the basis of factor loadings in combination with conceptual content. Similarly, though there were additional peer support items in the SDQ, these were not considered as valid as those from the SRS since SDQ items tend to have strong floor and ceiling effects (Black, Mansfield, & Panayiotou, 2020), while the SRS has a longer response format and simpler wording.

In addition to the considerations above, we erred on the side of rejection since the panel network method cannot handle large numbers of indicators and the computation time for each model was long. For instance, we could have included anger items which can be relevant to internalizing symptoms but chose to keep focus purely on classically internalizing problems. The process of decisions for item selection is shown in table S1 below.

Table S1 item choice decisions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Initial subscales of interest | conceptual relevance | Y/N based on CFA/content | final item set (main analysis) | core or multiple operationalization | Code book | | |
| **SWEMWBS** |  |  |  |  | Abbreviation (operationalization) | Position in data/node number | Variable name (excluding time, 1/2/3, replaced with *t*) |
| I’ve been feeling optimistic about the future | Y | NA | Y | MO | Optimism (A) | 19 | WB*t*\_1 |
| I’ve been feeling useful | Y | NA | Y | C | Useful | 1 | WB*t*\_2 |
| I’ve been feeling relaxed | Y | NA | Y | C | Relaxed | 2 | WB*t*\_3 |
| I’ve been dealing with problems well | Y | NA | Y | MO | Problem (A) | 20 | WB*t*\_4 |
| I’ve been thinking clearly | Y | NA | Y | C | Think | 3 | WB*t*\_5 |
| I’ve been feeling close to other people | Y | NA | Y | C | Close | 4 | WB*t*\_6 |
| I’ve been able to make up my own mind about things | Y | NA | Y | MO | Mind (A) | 21 | WB*t*\_7 |
| **SDQ emotional problems subscale** |  |  | Y |  |  |  |  |
| I get a lot of headaches, stomach-aches or sickness | Y | NA | Y | C | Somatic | 5 | SDQ*t*\_3 |
| I worry a lot | Y | NA | Y | C | Worry | 6 | SDQ*t*\_8 |
| I am often unhappy, down-hearted or tearful | Y | NA | Y | C | Unhappy | 7 | SDQ*t*\_13 |
| I am nervous in new situations. I easily lose confidence | Y | NA | Y | C | Nervous | 8 | SDQ*t*\_16 |
| I have many fears, I am easily scared | Y | NA | Y | C | Scared | 9 | SDQ*t*\_24 |
| **SDQ hyperactivity-inattention subscale** |  |  |  |  |  |  |  |
| I am restless, I cannot stay still for long | Y | NA | Y | C | Restless | 10 | SDQ*t*\_2 |
| I am constantly fidgeting or squirming | REJECT: conceptual overlap with restless, less simple wording | NA | N | NA |  |  |  |
| I am easily distracted, I find it difficult to concentrate | Y | NA | Y | MO | Distracted (A) | 22 | SDQ*t*\_15 |
| I think before I do things | REJECT: more externalizing symptom | NA | N | NA |  |  |  |
| I finish the work I'm doing. My attention is good | Y | NA | Y | MO | Distracted (B) | 22 | SDQ*t*\_25 |
| **SDQ peer problems subscale** |  |  |  |  |  |  |  |
| I am usually on my own. I generally play alone or keep to myself | Y | NA | Y | C | Withdrawn | 11 | SDQ*t*\_6 |
| I have one good friend or more | REJECT: SRS peer support items preferred due to longer response format | NA | N | NA |  |  |  |
| Other people my age generally like me | REJECT: SRS peer support items preferred due to longer response format | NA | N | NA |  |  |  |
| Other children or young people pick on me or bully me | Y | NA | Y | C | Bully | 12 | SDQ*t*\_19 |
| I get on better with adults than with people my own age | REJECT: SRS family support items deemed more conceptually useful | NA | N | NA |  |  |  |
| **TEIQUE-ASF emotion regulation** |  |  |  |  |  |  |  |
| I find it hard to control my feelings | Y | NA | Y | C | Feelings | 14 | ER*t*\_1or |
| I change my mind often | Y | NA | Y | MO | Mind (B) | 21 | ER*t*\_2or |
| I’m able to deal with stress | Y | NA | Y | C | Stress | 13 | ER*t*\_3 |
| I can control my anger when I want to | REJECT: focus is on internalizing symptoms so this item might capture externalizing comorbidity | NA | N | NA |  |  |  |
| Sometimes, I get involved in things later I wish I could get out of | REJECT: not so clearly linked to mental health as feelings/stress items are (ambiguous wording) | NA | N | NA |  |  |  |
| I try to control my thoughts and not worry too much aboutthings | REJECT: complex item- double barrel | NA | N | NA |  |  |  |
| **SRS home support subscale**  at home, there is an adult who... |  |  |  |  |  |  |  |
| ... is interested in my school work | Y | N | N | NA |  |  |  |
| ... believes that I will be a success | Y | N | N | NA |  |  |  |
| ... wants me to do my best | Y | N | N | NA |  |  |  |
| ... listens to me when I have something to say | Y | Y | Y | C | Home | 15 | HOME*t*\_4 |
| **SRS school support subscale**  at school, there is an adult who... |  |  |  |  |  |  |  |
| ... really cares about me | Y | Y | Y | C | School | 16 | SCH*t*\_1 |
| ... tells me when I do a good job | Y | N | N | NA |  |  |  |
| ... listens to me when I have something to say | Y | N | N | NA |  |  |  |
| ... believes that I will be a success | Y | N | N | NA |  |  |  |
| **SRS peer support subscale**  are there students at your school who would... |  |  |  |  |  |  |  |
| ... choose you on their team at school | Y | N | N | NA |  |  |  |
| … tell you you’re good at doing things | Y | N | N | NA |  |  |  |
| ... explain the rules of a game if you didn't understand them | Y | N | N | NA |  |  |  |
| ... invite you to their home | Y | N | N | NA |  |  |  |
| ... share things with you | Y | N | N | NA |  |  |  |
| ... help you if you hurt yourself | Y | N | N | NA |  |  |  |
| ... miss you if you weren’t at school | Y | N | N | NA |  |  |  |
| ... make you feel better if something is bothering you | Y | Y | Y | C | Peer | 17 | PEER*t*\_8 |
| ... pick you for a partner | Y | N | N | NA |  |  |  |
| ... help you if other students are being mean to you | Y | N | N | NA |  |  |  |
| ... tell you you’re their friend | Y | N | N | NA |  |  |  |
| ... ask you to join in when you are all alone | Y | N | N | NA |  |  |  |
| ... tell you secrets | Y | N | N | NA |  |  |  |
| **PSS** |  |  |  |  |  |  |  |
| In the last month, how often have you felt that you were unable to control the important things in your life? | REJECT: less relevant than other items |  | N | NA |  |  |  |
| In the last month, how often have you felt confident about your ability to handle your personal problems? | Y | NA | Y | MO | Problem (B) | 20 | PSS*t*\_2 |
| In the last month, how often have you felt that things were going your way? | Y | NA | Y | MO | Optimism (B) | 19 | PSS*t*\_3 |
| In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? | Reject: less relevant/complex wording |  | N | NA |  |  |  |
| **SRS other (some still completely omitted)** |  |  |  |  |  |  |  |
| When I need help, I find someone to talk to | Y | Y | Y | C | Help | 18 | PROB*t*\_1 |
| I know where to go for help when I have a problem | Y | N | N | NA |  |  |  |
| I try to work out problems by talking about them | Y | N | N | NA |  |  |  |

Time 2 factor loadings relevant to the above decisions are presented below (items are named in the order corresponding to the battery linked above).

Table S2 SRS Peer item factor loadings

|  |  |  |
| --- | --- | --- |
| Item | Loading | P value |
| PEER2\_1 | 0.754 | 0 |
| PEER2\_2 | 0.779 | 0 |
| PEER2\_3 | 0.742 | 0 |
| PEER2\_4 | 0.759 | 0 |
| PEER2\_5 | 0.828 | 0 |
| PEER2\_6 | 0.837 | 0 |
| PEER2\_7 | 0.807 | 0 |
| PEER2\_8 | 0.855 | 0 |
| PEER2\_9 | 0.834 | 0 |
| PEER2\_10 | 0.849 | 0 |
| PEER2\_11 | 0.856 | 0 |
| PEER2\_12 | 0.871 | 0 |
| PEER2\_13 | 0.76 | 0 |

Table S3 SRS Home item factor loadings

|  |  |  |
| --- | --- | --- |
| Item | Loading | P value |
| HOME2\_1 | 0.799 | 0 |
| HOME2\_2 | 0.88 | 0 |
| HOME2\_3 | 0.87 | 0 |
| HOME2\_4 | 0.794 | 0 |

Table S4 SRS School item factor loadings

|  |  |  |
| --- | --- | --- |
| Item | Loading | P value |
| SCH2\_1 | 0.826 | 0 |
| SCH2\_2 | 0.863 | 0 |
| SCH2\_3 | 0.856 | 0 |
| SCH2\_4 | 0.87 | 0 |

Table S5 SRS

|  |  |  |
| --- | --- | --- |
| Item | Loading | P value |
| PROB2\_1 | 0.861 | 0 |
| PROB2\_2 | 0.734 | 0 |
| PROB2\_3 | 0.847 | 0 |

**References**

Black, L., Mansfield, R., & Panayiotou, M. (2020). Age Appropriateness of the Self-Report Strengths and Difficulties Questionnaire. *Assessment, 0*(0), 1073191120903382. doi:10.1177/1073191120903382