**Supplemental material**

**Protective effect of restorative possibilities on cognitive function and mental health in children and adolescents: A scoping review including the role of physical activity**

**Table S1. Search terms and search block used in scoping review (in 2020)**

|  |  |
| --- | --- |
| **Search blocks** | **Search terms** |
| **Population** | neonat\* OR zygot\* OR embryo\* OR fetus OR foetus OR fetal OR newborn\* OR child\* OR infant OR infancy OR toddler OR puberty OR pubertal OR early life OR teen\* OR youth\* OR adolescen\* OR juvenile\* OR young\* OR pre-teen\* OR preteen\* OR pre-adolescen\* OR preadolescen\* OR pediatric OR student OR pre-school OR school |
| AND |
| **Exposome** | #1 exposome OR “lifecourse epidemiology” OR co-expos\* OR omics#2 expos\* OR environment\* OR hazards OR risk OR risks#3 joint OR combi\* OR complex OR synerg\* OR additive\* OR multi OR multiple OR cumulat\* OR collect\* OR interact\* OR compensat\* OR lifetime OR life-long OR totality OR several OR interplay OR holistic OR “more than one” OR comprehensive OR stress\* OR overall#4 nois\* OR pollut\* OR "particulate matter" OR dust OR vibrat\* OR electromagn\* OR climate OR weather OR temperature OR humid\* OR season\* OR water OR food OR nutri\* OR diet OR green OR blue OR natur\* OR outdoor OR restorative OR mould OR mold OR damp\* OR "built environment" OR indoor OR housing OR dwelling OR residential OR urban OR rural OR school OR pre-school OR daycare OR kindergarten(#1 OR (#2 AND #3)) AND #4For the (#2 AND #3), proximity operators were used in a way that the search terms in #2 should be maximum 4 words apart from the search terms in #3 |
| AND |
| **Outcome** | mental OR psych\* OR internali\* OR externali\* OR “conduct disorder” OR emotion\* OR “affective symptoms” OR mood OR temper\* OR sadness OR anxiety OR depress\* OR neurodevelop\* ORbehaviour\* OR behaviour\* OR neuropsychology OR neurobehavior OR neurobehaviour OR hyperactiv\* OR autis\* OR personality OR obsessive OR “eating disorder” OR hyperactiv\* OR “oppositional defiant” OR p-factor OR tics OR self-harm OR cognit\* OR reading OR spelling OR math\* or arithmetic\* OR literacyOR intellect\* OR intelligen\* OR iq OR language OR speech OR learn\* OR memory OR “executive functions” OR “executive function” OR attenti\* OR inattenti\*OR competence\* OR skill\* OR “problem solving” OR wellbeing OR well-being OR “well being” OR “quality of life” OR “peer-relation” OR “approval seeking” OR empath\* OR empower\* OR agressi\* OR anger OR irritation OR helpless\* OR hopeless\* OR attachment OR insecur\* OR secur\* OR powerless\* OR addiction OR addicted OR delinquen\* OR prosocial OR pro-social OR stubborn OR tantrum OR antisocial OR SDQ OR ((school OR academic OR educat\*) AND (achievement OR attainment OR perform\* OR grades)) For the search ((school OR academic OR educat\*) AND (achievement OR attainment OR perform\* OR grades)), proximity operators were used in a way that the search terms in the first bracket should be maximum 4 words apart from the search terms in the second bracket. |
| AND |
| **Mediation** | mediat\* OR pathway\* OR mechanis\* OR “structural equation” OR ”path analysis” OR moderat\* |
| AND |
| **Stress/restoration** | \*stress\* OR restoration OR restorative OR tension OR tense OR optimism OR pessimism OR “perceived control” OR helpless\* OR (appraisal AND stress) OR coping OR “life events” OR trauma\* OR resilien\* OR resistance OR adaptation OR fear OR startle OR uncontrollability OR controllability OR rumination OR worry OR worries OR predictability OR unpredictability OR anxiety OR discomfort OR exhaustion OR “person-environment-fit” OR “daily hassles” OR annoy\* OR disturb\* OR impair\* OR "HPA-axis" OR cortisol OR ACTH OR glucocorticoid\* OR cortico\* OR norepinephrine OR adrenaline OR epinephrine OR noradrenaline OR “hypothalamic pituitary adrenal axis” OR HPA OR “sympathetic nervous” OR allosta\* OR homeosta\*  |

Note. Underlined search terms were added for the second search on Oct 5, 2020. In the Specific social and internal exposures were considered at a later stage, during screening the retrieved study records.

**Section S1. Search string used in the latest update of the searches in Scopus (December 2022)**

limited to: keywords human, humans, publication year 2020-2023, language English, publication type article/review

result: 617

( ( TITLE-ABS-KEY ( \*stress\* OR restoration OR restorative OR tension OR tense OR optimism OR pessimism OR "perceived control" OR helpless\* OR coping OR "life events" OR trauma\* OR resilien\* OR resistance OR adaptation OR fear OR startle OR uncontrollability OR controllability OR rumination OR worry OR worries OR predictability OR unpredictability OR anxiety OR discomfort OR exhaustion OR "person-environment-fit" OR "daily hassles" OR annoy\* OR disturb\* OR impair\* OR "HPA-axis" OR cortisol OR acth OR glucocorticoid\* OR cortico\* OR norepinephrine OR adrenaline OR epinephrine OR noradrenaline OR "hypothalamic pituitary adrenal axis" OR hpa OR "sympathetic nervous" OR allosta\* OR homeosta\* ) ) OR ( TITLE-ABS-KEY ( appraisal ) AND TITLE-ABS-KEY ( stress ) ) ) AND ( ( ( TITLE-ABS-KEY ( neonat\* OR zygot\* OR embryo\* OR fetus OR foetus OR fetal OR newborn\* OR child\* OR infant OR infancy OR toddler OR puberty OR pubertal OR "early life" OR teen\* OR youth\* OR adolescen\* OR juvenile\* OR young\* OR pre-teen\* OR preteen\* OR pre-adolescen\* OR preadolescen\* OR pediatric OR student OR pre-school OR school\* ) ) AND ( ( TITLE-ABS-KEY ( exposome OR "Lifecourse epidemiology" OR co-expos\* OR omics ) ) OR ( TITLE-ABS-KEY ( expos\* OR environment\* OR hazards OR risk OR risks ) W/4 TITLE-ABS-KEY ( joint OR combi\* OR complex OR synerg\* OR additive\* OR multi OR multiple OR cumulat\* OR collect\* OR interact\* OR compensat\* OR lifetime OR life-long OR totality OR several OR interplay OR holistic OR "more than one" OR comprehensive OR stress\* OR overall ) ) ) AND ( TITLE-ABS-KEY ( nois\* OR pollut\* OR "particulate matter" OR dust OR vibrat\* OR electromagn\* OR climate OR weather OR temperature OR humid\* OR season\* OR water OR food OR nutri\* OR diet OR green OR blue OR natur\* OR outdoor OR restorative OR mould OR mold OR damp\* OR "built environment" OR indoor OR housing OR dwelling OR residential OR urban OR rural OR school OR pre-school OR daycare OR kindergarten ) ) AND ( ( TITLE-ABS-KEY ( mental OR psych\* OR internali\* OR externali\* OR "conduct disorder" OR emotion\* OR "affective symptoms" OR mood OR temper\* OR sadness OR anxiety OR depress\* OR neurodevelop\* OR behaviour\* OR behavior\* OR neuropsychology OR neurobehavior OR neurobehaviour OR autis\* OR personality OR obsessive OR "eating disorder" OR hyperactiv\* OR "oppositional defiant" OR p-factor OR tics OR self-harm OR cognit\* OR reading OR spelling OR math\* OR arithmetic\* OR literacy OR intellect\* OR intelligen\* OR iq OR language OR speech OR learn\* OR memory OR "executive functions" OR "executive function" OR "executive functioning" OR attenti\* OR inattenti\* OR competence\* OR skill\* OR "problem solving" OR wellbeing OR well-being OR "well being" OR "quality of life" OR "peer-relation" OR "approval seeking" OR empath\* OR empower\* OR agressi\* OR anger OR irritation OR helpless\* OR hopeless\* OR attachment OR insecur\* OR secur\* OR powerless\* OR addiction OR addicted OR delinquen\* OR prosocial OR pro-social OR stubborn OR tantrum OR antisocial OR sdq ) ) OR ( TITLE-ABS-KEY ( school OR academic OR educat\* ) W/4 TITLE-ABS-KEY ( achievement OR attainment OR perform\* OR grades ) ) ) ) AND ( TITLE-ABS-KEY ( mediat\* OR pathway\* OR mechanis\* OR "structural equation" OR "path analysis" OR moderat\* ) ) )

**Section S2. Search string used in the latest update of the searches in PsycInfo (December 2022)**

Limiters Publication year 2020-2023. Language English, Peer reviewed

result: 233

((ab(stress\* OR restoration OR restorative OR tension OR tense OR optimism OR pessimism OR "perceived control" OR helpless\* OR (appraisal AND stress) OR coping OR "life events" OR trauma\* OR resilien\* OR resistance OR adaptation OR fear OR startle OR uncontrollability OR controllability OR rumination OR worry OR worries OR predictability OR unpredictability OR anxiety OR discomfort OR exhaustion OR person-environment-fit OR "daily hassles" OR annoy\* OR disturb\* OR impair\* OR "HPA-axis" OR cortisol OR ACTH OR glucocorticoid\* OR cortico\* OR norepinephrine OR adrenaline OR epinephrine OR noradrenaline OR "hypothalamic pituitary adrenal axis" OR HPA OR "sympathetic nervous" OR allosta\* OR homeosta\*) OR ti(stress\* OR restoration OR restorative OR tension OR tense OR optimism OR pessimism OR "perceived control" OR helpless\* OR (appraisal AND stress) OR coping OR "life events" OR trauma\* OR resilien\* OR resistance OR adaptation OR fear OR startle OR uncontrollability OR controllability OR rumination OR worry OR worries OR predictability OR unpredictability OR anxiety OR discomfort OR exhaustion OR person-environment-fit OR "daily hassles" OR annoy\* OR disturb\* OR impair\* OR "HPA-axis" OR cortisol OR ACTH OR glucocorticoid\* OR cortico\* OR norepinephrine OR adrenaline OR epinephrine OR noradrenaline OR "hypothalamic pituitary adrenal axis" OR HPA OR "sympathetic nervous" OR allosta\* OR homeosta\*)) AND PEER(yes)) AND ((ab(neonat\* OR zygot\* OR embryo\* OR fetus OR foetus OR fetal OR newborn\* OR child\* OR infant OR infancy OR toddler OR puberty OR pubertal OR "early life" OR teen\* OR youth\* OR adolescen\* OR juvenile\* OR young\* OR pre-teen\* OR preteen\* OR pre-adolescen\* OR preadolescen\* OR pediatric OR student OR pre-scool OR school) OR ti(neonat\* OR zygot\* OR embryo\* OR fetus OR foetus OR fetal OR newborn\* OR child\* OR infant OR infancy OR toddler OR puberty OR pubertal OR "early life" OR teen\* OR youth\* OR adolescen\* OR juvenile\* OR young\* OR pre-teen\* OR preteen\* OR pre-adolescen\* OR preadolescen\* OR pediatric OR student OR pre-scool OR school)) AND ((ti(school OR academic OR educat\*) NEAR/4 ti(achievement OR attainment OR perform\* OR grades) OR ab(school OR academic OR educat\*) NEAR/4 ab(achievement OR attainment OR perform\* OR grades)) OR (ab(mental OR psych\* OR internali\* OR externali\* OR "conduct disorder" OR emotion\* OR "affective symptoms" OR mood OR temper\* OR Sadness OR anxiety OR depress\* OR neurodevelop\* OR behavior\* OR behavior\* OR neuropsychology OR neurobehavior OR neurobehaviour OR spelling OR math\* or arithmetic\* OR literacy\* OR memory OR ”executive functions” or ”executive function” or ”executive functioning” OR attenti\* OR inattenti\* OR skill\* OR irritation OR SDQ OR hyperactiv\* OR autis\* OR personality OR obsessive OR "eating disorder" OR hyperactiv\* OR "oppositional defiant" OR p-factor OR tics OR self-harm OR Cognit\* OR reading OR intellect\* OR intelligen\* OR iq OR language OR speech OR learn\* OR competence\* OR "problem solving" OR wellbeing OR well-being OR "well being" OR "quality of life" OR "peer-relation" OR "approval seeking" OR empath\* OR empower\* OR agressi\* OR anger OR helpless\* OR hopeless\* OR attachment OR insecur\* OR secur\* OR powerless\* OR addiction OR addicted OR delinquen\* OR prosocial OR pro-social OR stubborn OR tantrum OR antisocial) OR ti(mental OR psych\* OR internali\* OR externali\* OR "conduct disorder" OR emotion\* OR "affective symptoms" OR mood OR temper\* OR Sadness OR anxiety OR depress\* OR neurodevelop\* OR behavior\* OR behavior\* OR neuropsychology OR neurobehavior OR neurobehaviour OR spelling OR math\* or arithmetic\* OR literacy\* OR memory OR ”executive functions” or ”executive function” or ”executive functioning” OR attenti\* OR inattenti\* OR skill\* OR irritation OR SDQ OR hyperactiv\* OR autis\* OR personality OR obsessive OR "eating disorder" OR hyperactiv\* OR "oppositional defiant" OR p-factor OR tics OR self-harm OR Cognit\* OR reading OR intellect\* OR intelligen\* OR iq OR language OR speech OR learn\* OR competence\* OR "problem solving" OR wellbeing OR well-being OR "well being" OR "quality of life" OR "peer-relation" OR "approval seeking" OR empath\* OR empower\* OR agressi\* OR anger OR helpless\* OR hopeless\* OR attachment OR insecur\* OR secur\* OR powerless\* OR addiction OR addicted OR delinquen\* OR prosocial OR pro-social OR stubborn OR tantrum OR antisocial))) AND (ab(Nois\* OR Pollut\* OR "particulate matter" OR dust OR Vibrat\* OR Electromagn\* OR climate OR weather OR temperature OR Humid\* OR Season\* OR water OR food OR nutri\* OR diet OR green OR blue OR natur\* OR outdoor OR restorative OR Mould OR mold OR Damp\* OR "built environment" OR indoor OR housing OR dwelling OR residential OR urban OR rural OR school OR pre-school OR daycare OR kindergarten) OR ti(Nois\* OR Pollut\* OR "particulate matter" OR dust OR Vibrat\* OR Electromagn\* OR climate OR weather OR temperature OR Humid\* OR Season\* OR water OR food OR nutri\* OR diet OR green OR blue OR natur\* OR outdoor OR restorative OR Mould OR mold OR Damp\* OR "built environment" OR indoor OR housing OR dwelling OR residential OR urban OR rural OR school OR pre-school OR daycare OR kindergarten)) AND ((ab("Lifecourse epidemiology" OR Co-expos\* OR omics) OR ti("Lifecourse epidemiology" OR Co-expos\* OR omics)) OR (ab(expos\* OR environment\* OR hazards OR risk OR risks) NEAR/4 ab(joint OR combi\* OR complex OR synerg\* OR additive\* OR multi OR multiple OR cumulat\* OR collect\* OR interact\* OR compensat\* OR lifetime OR Life-long OR totality OR several OR interplay OR holistic OR "more than one" OR comprehensive OR stress\* OR overall)) OR (ti(expos\* OR environment\* OR hazards OR risk OR risks) NEAR/4 ti(joint OR combi\* OR complex OR synerg\* OR additive\* OR multi OR multiple OR cumulat\* OR collect\* OR interact\* OR compensat\* OR lifetime OR Life-long OR totality OR several OR interplay OR holistic OR "more than one" OR comprehensive OR stress\* OR overall))) AND (ab(mediat\* OR pathway\* OR mechanis\* OR "structural equation" OR "path analysis" OR moderat\*) OR ti(mediat\* OR pathway\* OR mechanis\* OR "structural equation" OR "path analysis" OR moderat\*)))