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## Childhood trauma histories in men and women assessed by the childhood attachment and relational trauma screen (CARTS) and the global psychotrauma screen (GPS): Results from the global collaboration on traumatic stress (GC-TS)

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### ABSTRACT

**Background:** Whether there are biological sex differences in rates of childhood trauma exposure perpetrated by female versus male biological parents remains largely unknown. Moreover, the relative risk posed by various vulnerability factors for transdiagnostic mental health outcomes among females vs. males in adulthood has received insufficient attention.

**Objective:** To compare biological sex differences in the long-term impact of childhood abuse and neglect on transdiagnostic mental health outcomes, especially comparing the outcomes of childhood maltreatment perpetrated by biological mothers vs. fathers.

**Participants and setting:** 3129 participants (2784 female [89 %]) were recruited online, the majority (82 %) of whom endorsed having a childhood trauma history and a high number of mental health problems.

**Methods:** Online surveys were administered. Specifically, the *Childhood Attachment and Relational Trauma Screen (CARTS)* was completed as a relationally-contextualized screening measure of both positive and traumatic-neglectful experiences during childhood, comparing severity of perpetration by male vs. female biological parents. Further, the *Global Psychotrauma Screen (GPS)* was completed to assess the relative risk of five vulnerability factors, including childhood abuse and neglect, for long-term transdiagnostic mental health outcomes. Statistical analyses elucidate group differences between males and females primarily by way of *t*-tests and associated effect sizes (Cohen's *d*).

**Results:** Biological sex differences were shown for childhood maltreatment perpetration by male vs. female biological parents, wherein responses to CARTS showed that females reported that their biological *mothers* exhibited less positivity ( $d = 0.21$ ), less attachment security ( $d = 0.22$ ), more negative feelings toward them ( $d = 0.28$ ), were more emotionally abusive ( $d = 0.17$ ), and held more negative relational beliefs about them ( $d = 0.24$ ). Comparably, males reported that their biological *fathers* were more physically abusive ( $d = 0.15$ ) and that they held more negative relational beliefs toward their fathers ( $d = 0.25$ ). Risk factors including having a history of childhood trauma and neglect were associated with transdiagnostic mental health problems among both females ( $d = 0.57$ ) and males ( $d = 0.46$ ), with other risk factors evidencing similar results.

**Conclusions:** Childhood trauma and neglect is a risk factor for transdiagnostic mental health outcomes among both females and males, although the two biological sexes may exhibit different levels of risk of being maltreated by female and male biological parents. Specifically, females reported having more emotionally abusive biological mothers, while males reported having more physically abusive biological fathers.

Histories of childhood abuse and neglect confer increased risk for various psychological disorders in adulthood, with a recent umbrella meta-analysis inclusive of responses from 16,277 cases and 77,586 controls demonstrating that the presence of childhood

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trauma history poses a nearly three-fold increased risk for the diagnosis of any mental disorder (Hogg et al., 2023). More specifically, the presence of physical and sexual abuse history was indicative of a 2.36 and 3.47 fold increased risk for a range of mental disorder diagnoses, respectively, while the presence of a history of emotional abuse was associated with a 3.05 fold increased risk specifically for anxiety disorders (Hogg et al., 2023). Unfortunately, however, such results have not been investigated specifically in females vs. males, despite well-known sex differences in rates of psychopathology. Interestingly, however, surprisingly few studies provide comparably clear evidence of biological sex differences in childhood maltreatment rates except in the case of sexual abuse in which girls are victimized more often than boys (Stoltenborgh et al., 2015). Further investigation of biological sex differences in the relative risk of childhood abuse and neglect as a long-term risk factor for transdiagnostic mental health outcomes in adulthood is needed.

Meanwhile, although such results emphasize the developmental psychopathology principle of multifinality in analyzing the longer term transdiagnostic outcomes of childhood trauma (Cicchetti & Rogosch, 1996), the results of the umbrella meta-analysis conducted by Hogg and colleagues arguably fall within the so-called “soft” version of the transdiagnostic model insofar as they “preserve the underlying diagnostic classification while seeking to elucidate risk factors that have relevance to one or more of the diagnoses as traditionally formulated” (Dagleish et al., 2020, p. 182; Hogg et al., 2023). Comparably “hard” transdiagnostic approaches go further “with alternative frames of reference that characterize mental ill health in new ways” such as dimensional criteria comprised of mental health problems or symptoms and biopsychosocial processes that cut across traditional diagnostic boundaries (Dagleish et al., 2020, p. 182). Adhering to a hard approach therefore requires selecting outcome measures that “assess an array of symptom dimensions spanning multiple psychopathology spectra” (Stanton et al., 2020, p. 26), although feasibility considerations often preclude administration of lengthy surveys that can cover all relevant psychological symptoms, especially in online studies. Fortunately, briefer transdiagnostic measures are being validated, including the recently developed *Global Psychotrauma Screen* (GPS) which assesses the presence of 17 different trauma-related symptoms, including not only those associated with PTSD and Complex PTSD, but also depression, anxiety, dissociative experiences, and substance use problems (Olf, 2022). Further, consistent with the construct of a transdiagnostic “p-factor” for general psychopathology, a unifactorial solution was identified as best fitting for the 17 problem areas screened by the GPS (Frewen et al., 2021).

Whereas the aforementioned approaches to understanding posttraumatic mental health as transdiagnostic emphasize measurement of the multifinality of outcomes of childhood trauma, another form of the transdiagnostic model analyzes various transdiagnostic processes and risk factors that define the equifinality of mediators of such outcomes (Cicchetti & Rogosch, 1996). In this regard, the GPS also screens for the presence of five transdiagnostic risk factors, specifically, childhood trauma history, exposure to recent stressful events, psychological non-resilience, a history of mental illness, and the perceived absence of social support. However, to our knowledge, past research using the English version of the GPS has only evaluated the 17 outcomes while not the 5 risk factors, and so further evaluation of the GPS risk factors for transdiagnostic mental health outcomes is warranted, including by comparing the relative risk of each factor between females and males. For example, emerging theory postulates that social, emotional, and biological factors combine to mediate an overall increased risk for transdiagnostic outcomes, with caregiver support acting as a protective factor or “buffer” against such outcomes (McLaughlin et al., 2020). Referring to the latter, it has also long been known that not only explicit parental abuse and neglect but further negative and positive parenting behaviours, broadly defined, are predictive of the development of trauma and stressor-related disorders (e.g., Williamson et al., 2017), although research is needed to determine whether such an effect confers an equally strong risk for a broader range of transdiagnostic mental health outcomes in both females and males.

Moreover, the overall quality of early life trauma, especially that occurring within attachment relationships between child and caregiver is broadly known to be predictive of long-term mental health outcomes in adults (e.g., Lanius et al., 2010). With such results as a background, the *Childhood Attachment and Relational Trauma Screen* (CARTS; Frewen et al., 2013) was developed as a computerized, relationally contextualized screening measure of individuals’ recollection not only of abusive and/or maltreating experiences but also of the general affective quality of relational support provided to them during early life.

Referring to the impact of early relationships with primary caregivers, stereotypes suggest that biological mothers and fathers tend to provide care to or abuse their children in gendered ways, for example, a mothers’ emotional abuse of her daughter vs. a fathers’ physical abuse of his son. However, while much research has investigated gender differences in violence perpetration and victimization within dating relationships (e.g., Eisner, 2021) and among intimate partners (e.g., Langhinrichsen-Rohling, 2010; Winstok, 2011), remarkably little research has investigated gender differences in parent-to-child maltreatment, especially among Western samples. Furthermore, the few recent studies that have been conducted in other parts of the world have produced counter-intuitive results. For example, a study of Israeli university students (Mehlhausen-Hassoen, 2022) showed that while the majority of parental verbal and physical aggression against children was perpetrated by both biological parents rather than either alone, in cases involving only a sole perpetrator, this was more common for maternal physical aggression against sons (12 % vs. 3 %) and paternal verbal aggression against daughters (13 % vs. 7 %). Further, in one Chinese study, mothers were more often the perpetrators of severe physical abuse than were fathers (20 % vs. 13 %) (Cui et al., 2016), with a subsequent study demonstrating the especially deleterious impact of maternal physical abuse for internalizing and externalizing behaviours regardless of the presence of paternal abuse (Cui et al., 2018). A better understanding of sex-related differences in violence perpetration and victimization could therefore be relevant both to prevention as well as intervention efforts to reduce the long-term transdiagnostic impact of childhood abuse and neglect. Further research utilizing a relationally contextualized approach to assessment of emotional and physical forms of abuse could thus be helpful in better understanding biological sex differences in risk for affective disorders (Gallo et al., 2018; Zhang et al., 2020) and the biology that partly mediates such risk (Tiwari & Gonzalez, 2018).

In summary, further research is needed to understand biological sex differences in transdiagnostic mental health outcomes and the role of childhood abuse and neglect perpetrated by biological parents of each sex as risk factors for such outcomes. The current research thus compared biological sex differences in perceived attachment and relational trauma perpetrated by female vs. male

biological parents, and evaluated risk factors for long term transdiagnostic mental health consequences of trauma. These research aims were conducted through use of the CARTS and GPS as novel screening tools for the retrospective assessment of the occurrences and adult consequences of childhood abuse and neglect. The current report is, to our knowledge, the first to evaluate the CARTS and GPS together within the same respondents, the first to evaluate the GPS risk factor items individually in association with transdiagnostic mental health outcomes, and the first to compare responses between females and males on the CARTS as a means of assessing biological sex differences in attachment and relational trauma as perpetrated by each biological parent. Here, we recruited 3129 participants (2784 female [89 %]) to complete the CARTS and GPS together with demographics through the GC-TS website (<https://www.global-psycho-trauma.net/>). Based on the literature we hypothesized to find evidence supportive of the GPS risk factor items for transdiagnostic mental health outcomes, convergence of the GPS childhood trauma screening question with an overall response to the CARTS, and non-equivalence between the biological sexes in their recollection of their childhood experiences with their biological mothers and fathers as screened by the CARTS. Thus the current research sought to answer the following questions: 1) Are the 5 risk factors screened by the GPS associated with increased transdiagnostic mental health problems in adult females and males?, and 2) Do adult males and females differ in their reported histories of parent-to-child abuse and neglect?

**Table 1**  
Demographic characteristics.

|   | N    | %  |
|---|------|----|
| Biological Sex                                  |      |    |
| Females   | 2784 | 89 |
| Males   | 345  | 11 |
| Marital Status                                  |      |    |
| Single  | 1582 | 51 |
| Married   | 902  | 28 |
| Common-law                                      | 132  | 4  |
| Separated                                       | 75   | 2  |
| Divorced  | 259  | 8  |
| Widowed   | 22   | <1 |
| “Other”   | 99   | 3  |
| Declined to Answer                              | 58   | 4  |
| Education                                       |      |    |
| Graduate or professional degree                 | 975  | 31 |
| Undergraduate degree                            | 706  | 22 |
| College Education                               | 238  | 8  |
| Partial college or university                   | 686  | 22 |
| Secondary school                                | 359  | 11 |
| Did not complete secondary school               | 105  | 3  |
| “Other”   | 3    | <1 |
| Declined to Answer                              | 57   | 2  |
| Employment                                      |      |    |
| Externally employed FT/PT                       | 1660 | 53 |
| Self-employed                                   | 243  | 8  |
| Student   | 475  | 15 |
| Unable to work due to physical or mental health | 617  | 20 |
| “Other”   | 57   | 2  |
| Declined to Answer                              | 77   | 3  |
| Racial-Ethnic Background                        |      |    |
| Caucasian (European)                            | 2155 | 69 |
| “Mixed Race”                                    | 265  | 9  |
| “Other Race”                                    | 187  | 6  |
| South East Asian                                | 127  | 4  |
| Caucasian (Indian)                              | 33   | 1  |
| Caucasian (Middle Eastern)                      | 43   | 1  |
| Caucasian (North African / Other)               | 50   | 2  |
| Native American                                 | 27   | 1  |
| North East Asian                                | 17   | <1 |
| Pacific (Polynesian, Micronesian, others)       | 8    | <1 |
| West African, Bushmen, Ethiopian                | 30   | 1  |
| Other Specific Races                            | 6    | <1 |
| Declined to Answer                              | 181  | 6  |
| Psychiatric Diagnosis                           |      |    |
| Current   | 1722 | 55 |
| Past Only                                       | 387  | 12 |
| Never   | 902  | 29 |
| Declined to Answer                              | 114  | 4  |
| “Other”   | 4    | <1 |

## 1. Method

### 1.1. Participants

Participants ( $N = 3912$ ) elected to take part in the study as recruited through the GC-TS website (<https://www.global-psychotrauma.net/>). A study inclusion criterion was that participants reported being at least 18 years of age; 683 participants reported their age as younger than 18, leaving 3229 participants appropriate for analysis. Of these, 2784 reported their biological sex at birth to be female (89 %) while 345 reported it to be male (11 %); 100 participants declined to answer the question (3 %) and so could not be included in comparisons between males and females' response as reported herein. Additional demographic characteristics are summarized in Table 1.

### 1.2. Measures

#### 1.2.1. Childhood Attachment and Relational Trauma Screen (CARTS)

The CARTS is a screening measure of persons' characterization of their familial and non-familial relationships during childhood and adolescence, not only of abusive and/or maltreating experiences, but also of the general level of relational support available to them during development. In short, administering the CARTS involves presenting participants with descriptions of relationships (e.g., "I loved this person", "This person loved me") and asking them to whom, if anyone, each description applied when they were growing up as a child and/or teenager. Replicating the methodology of Frewen et al. (2015), participants provided answers that characterized up to 20 individuals with whom they had a familial relationship during childhood and/or adolescence, but could also specify that the statements applied to non-family members (e.g., participants might indicate the statement applied to friends, teachers, caretakers, etc. that did not meet their personal definition of "family").

Regardless, as directly pertinent to our research questions, the present results analyzed only the participant-determined overall applicability of items to any person (negatively keyed as a measure of "non-applicability"), as well as the determined applicability specifically to each biological parent, following the precedents set from the original research and development of the CARTS (Frewen et al., 2013). More, while a lengthier list of survey items comprised into 20 subscales was administered as undertaken by Frewen et al. (2015), to afford measurement of witnessing violence to and from parents and siblings, the current analysis was restricted to the original 13 subscales used by Frewen et al. (2013) to reduce risk of false positives associated with the conduct of multiple statistical tests. The 13 subscales including an exemplar item are as follows: 1) *Positive* (13 items; e.g., "I liked this person very much"); 2) *Secure* (8 items; e.g., "This person helped me feel better when I was sad or upset"); 3) *Positive Affect* (1 item; i.e., "This person was usually happy"); 4) *Negative Affect* (3 items; e.g., "This person was sad or upset a lot of the time"); 5) *Negative Feelings From* (4 items; e.g., "This person made me feel sad or upset"); 6) *Emotionally Abusive To Self* (2 items; e.g., "This person called me bad names"); 7) *Emotionally Abusive To Others* (2 items; e.g., "This person called other people in my family bad names"); 8) *Physically Abusive To Self* (2 items; e.g., "This person slapped, smacked, or hit me"); 9) *Physically Abusive To Others* (2 items; e.g., "This person slapped, smacked, or hit other people in my family"); 10) *Negative Beliefs To* (5 items; e.g., "I thought that this person didn't like me very much"); 11) *Negative Beliefs From* (5 items; e.g., "I didn't like this person very much"); 12) *Bad Things (Possible Abuse)* (3 items; e.g., "This person did bad things to me that I didn't like to talk about or think of"), and 13) *Sexual Abuse* (6 items; e.g., "This person touched my body in places where I didn't want them to").

Prior studies provide psychometric support for the construct validity of the CARTS including convergence with other similar measures and incremental validity for the assessment of applicability of the descriptions of each biological parent (e.g., Frewen et al., 2013, 2015). In the current sample, internal (alpha) reliabilities ranged from 0.647 to 0.955 for the "not applicable" ratings ( $Md = 0.825$ ,  $M = 0.815$ ,  $SD = 0.094$ ), ranged from 0.467 to 0.920 for the ratings referring to the biological mother ( $Md = 0.847$ ,  $M = 0.800$ ,  $SD = 0.143$ ), and ranged from 0.513 to 0.946 for the ratings referring to the biological father ( $Md = 0.847$ ,  $M = 0.811$ ,  $SD = 0.129$ ). As can be expected, lower reliabilities were observed for subscales for which the number of items comprising the subscale is low (e.g., some are only comprised of 2 items), as well as for the 3-item "Negative Affect" subscale for which a non-significant correlation tended to be observed between a person being rated as both frequently "mad and angry" and "scared or worried" ( $r = 0.328$  for "Not Applicable" ratings, but  $r = 0.008$  and  $r = 0.062$  for ratings referring to the biological mother and father, respectively). Similar observations have been made previously (Frewen et al., 2013, 2015) but the subscale has been retained for the sake of parsimony rather than describing each distinct emotional response separately.

#### 1.2.2. Global Psychotrauma Screen (GPS)

The 22-item version of the GPS (GPS 2.0) was used, which screens for transdiagnostic problems that individuals may experience in response to traumatic life events using a yes/no response format referring to presence/absence within the past month (Olf, 2022). The GPS comprised screening of 17 current mental health problems, and 5 prior risk factors.

The majority of the 17 items that assess current mental health problems were compiled from other validated instruments, including assessing PTSD, disturbances in self-organization, anxiety, depression, sleep problems, self-harm, dissociation, and substance abuse. As such, the GPS recognizes that posttraumatic responses extend beyond the symptoms of PTSD and other singular psychological disorders, and are more appropriately assessed transdiagnostically (Frewen et al., 2021; Olf, 2022). The GPS user-guide encourages the use of summary scores including an overall symptom score across all 17-items which was further validated in the current results as evidenced by a high internal consistency reliability across the 17-items ( $\alpha = 0.84$ ; intraclass correlation coefficient = 0.24, item-total correlations ranged between 0.34 and 0.55). Population norms reported in the GPS User-Guide suggest that females ( $N = 6609$ ) tend to

score higher than males ( $N = 2132$ ) on this 17-item transdiagnostic symptom list ( $M = 8.48$ ,  $SD = 4.66$ , vs.  $M = 6.45$ ,  $SD = 4.80$ ), values to which those collected from the current study participants were compared. As a whole, extensive psychometric support has been garnered for the reliability and validity of the 17 GPS transdiagnostic mental health symptoms as summarized in the user manual (Olf, 2022).

Comparably, the remaining five items of the GPS assess risk factors, specifically, childhood trauma exposure, exposure to other recent stressful events, absence of social support, psychological non-resilience, and history of mental illness. However, to our knowledge, these screening questions have received little specific attention in research or validity studies that have used the GPS to date, and so were the subject of further investigation in the current study. While the user-guide also encourages calculation of a summative overall level of risk across these 5 items, we refrained from doing so in the current study because internal consistency reliability across the 5 items was determined to be low ( $\alpha = 0.27$ ; intraclass correlation coefficient = 0.07, item-total correlations ranged between 0.03 and 0.19). As a result, we report results for each of the risk factors separately. Of note, childhood trauma exposure was screened via item number 20 of the GPS as follows: “*During your childhood (0-18 years), did you experience any traumatic life events (e.g., a serious accident or fire, physical or sexual assault or abuse, a disaster, seeing someone be killed or seriously injured, or having a loved one die)?*” and so conceptualizes childhood trauma using an inclusive definition similar to the concept of adverse childhood experiences beyond only those of childhood abuse and neglect (e.g., accidents, loss).

### 1.3. Procedure

The research procedures were approved by the institutional research ethics board of Western University, Canada. We utilized a passive recruitment strategy from the Global Collaboration on Traumatic Stress (GC-TS) website (<https://www.global-psycho-trauma.net/>). The GC-TS is a collaborative among various traumatic stress societies that originated around the goal to address globally significant traumatic stress-related problems, in the first case those relating to *childhood abuse and neglect*. Here, the specific early aims of the GC-TS were toward improving our cross-cultural understanding and assessment/screening of childhood trauma and its long-term consequences in adults (Olf et al., 2020; Schnyder et al., 2017), including the present effort to further investigate responses to the CARTS and GPS.

Referring to our use of a passive recruitment strategy, no notable efforts were undertaken by the research team to publicize the study as a means to actively recruit research participants. Instead, participants who visited the GC-TS website of their own accord were invited to complete the surveys by clicking on an advertisement link that then directed them to an external website. We note that, due to the content of the GC-TS website having to do with the study of traumatic events and their long-term consequences for mental health including PTSD, we anticipated that recruiting from this website might result in some self-selection involving high sampling from persons with past traumatic experiences, including childhood trauma and neglect. Indeed the advertisement posted on the aforementioned website was as follows: “*You are invited to complete a survey about individuals’ recollections of the quality of their relationships with their family members during childhood, and of relational traumatic experiences occurring during childhood. Please click here to complete the survey in ENGLISH.*”

Clicking on said advertisement brought participants to a letter of information that more fully described the research procedures and emphasized the voluntary and confidential nature of the invitation to participate, the fact that they were free to “*leave the study at any time simply by exiting the computer application*”, that they “*may also refuse to answer any question you do not want to answer by clicking ‘skip’*”, and the contact information of the principal investigator should they have any questions or concerns requiring address prior to providing their consent to participate. Referring to the CARTS, it was specified that: “*Completion of this survey will involve indicating who was in your family and your relationship to them (e.g., Mother, Father, Sister, Brother, etc). After this, you will read various statements, which relate to quality of relationships (e.g., ‘I liked this person very much’) or possibly traumatic experiences (e.g., ‘This person used to hit me a lot’). If a statement describes your relationship or experiences with one or more of your family members, you will be asked to indicate to whom on the computer by clicking with the computer mouse on stick-figure pictures of your family members that you will see on the computer screen. If a statement does not describe your relationship or experiences with any of your family members, you will be asked to indicate this by clicking with the computer mouse on an ‘X’ that you will see on the computer screen.*” Moreover, it was noted that participation would also involve completing “*additional standard surveys that ask about your mood, personality, and psychological symptoms.*” Participants were also appraised of the risk of becoming emotionally upset while completing the surveys and of online websites and hotlines they could contact in order to seek help in the case that they became overwhelmed. Ultimately, their agreement and consent to participate was indicated by button-press at the end of the letter of information.

The GPS was completed before the CARTS, while demographics were assessed prior to the GPS. A significant majority of respondents reported that they had completed the surveys from the privacy of their homes (2494, 77 %) while 334 (10 %) reported they completed the survey via mobile in a public place, at an institution or place of business (112, 4 %), or declined to answer the question (294, 9 %). Participants did not receive any form of compensation for completing the surveys. Data has also been collected for this study in multiple other languages following the same procedures, but the current research is limited to descriptions of responses collected using the English language versions; future studies will detail results collected from administrations of the surveys in other languages.

### 1.4. Statistical analysis

Importantly, there is no possible missingness by accident in the current research – progress in survey completion was automatically checked via the website with participants prompted for missing responses. By contrast, willful withholding of survey responses was

naturally an ethically mandated option, thus participants always had the ability to answer questions by selecting “Choosing NOT to Answer” or to “Skip this Question” and the like. As such, we preferred not to use data replacement techniques that may be more appropriate for cases of missing data at random (i.e., our missing data would NOT be missing at random). Survey questions that were not answered, however, were found to be rare. Such responses were left as missing, with subscale scores on the CARTS and GPS calculated by summing representative items for which responses were gathered, and participant sample sizes obtained per analysis are clearly reported in the results.

Between-groups *t*-tests were used to compare responses to the GPS and CARTS obtained from females vs. males within the current sample, with Cohen’s *d* reported as a standardized effect size. More, the values obtained by the current samples were compared with the normative values reported in the GPS manual as previously noted in the methods, which were undertaken in female and male participants separately.

To evaluate whether each of the five GPS risk factors were associated with transdiagnostic mental health problems, we compared the mean GPS symptom scores obtained from the subsample of participants who endorsed each risk factor to those obtained from participants who did not endorse the risk factor, using between-groups *t*-tests. Again, such analyses were conducted in female and male participants separately, and Cohen’s *d* was again reported as the measure of effect size. Further, referring specifically to the GPS risk factor screener for childhood abuse, we compared scores on each of the CARTS subscales between those who endorsed the GPS item and those that did not, again, using between-groups *t*-tests separately in female vs. male participants.

Finally, we conducted a multiple regression analysis to determine whether retrospectively assessed childhood trauma was concurrently predictive of the sum number of GPS transdiagnostic mental health symptoms that were endorsed. First, we included the GPS screening item as a predictor. Second, we included the overall applicability of CARTS ratings as a predictor. Third, we then included CARTS ratings referring specifically to biological mothers and fathers as a predictor. The relative and statistical significance of the increased percentage of variance in GPS symptoms accounted for was determined at each of the three steps. These analyses were also completed separately among female and male participants.

## 2. Results

### 2.1. Global Psychotrauma Screen (GPS): Are the 5 risk factors screened by the GPS associated with increased transdiagnostic mental health problems in adult females and males?

Referring to the GPS risk factors, please see Table 2 for a full documentation of descriptive and inferential statistics. In short, within females, endorsement of each of the five GPS risk factor items were associated with a higher number of GPS symptoms with a medium effect size ( $0.57 \leq d \leq 0.77$ ) except in the case of self-described non-resilience for which a smaller effect size was obtained ( $d = 0.38$ ). Similar results were observed among males ( $0.46 \leq d \leq 0.91$ ) although the results for non-resilience did not reach significance with  $d = 0.18$ . Altogether, these statistical outcomes serve to validate each of the GPS risk factors in their relation to elevated transdiagnostic mental health outcomes in both females and males, with the possible exception of resilience. Further, despite the high prevalence of risk factors within the current sample, it is important to point out that about five persons to one considered themselves to be resilient ( $n = 2464, 2202$  females and 262 males) than did not ( $n = 509, 447$  females and 62 males) which may partly explain its lower obtained effect size as a risk factor.

Of particular importance to the GC-TS thematic focus on childhood trauma and neglect, to further investigate the GPS screener for childhood trauma history, we compared the overall applicability of responses to the CARTS (i.e., whether the CARTS subscales applied to any person) between those who endorsed the GPS childhood trauma risk factor and those that did not, separately among female and male participants. Descriptive statistics are reported in Table 3. Generally with a medium to large effect size and among both females

**Table 2**

Descriptive statistics and group comparisons between those who did vs. did not endorse each of five risk factors and overall transdiagnostic symptoms on the GPS in females vs. males.

|                                   | With Risk Factor |      |      | Without Risk Factor |      |      | Statistics |        |      |
|-----------------------------------|------------------|------|------|---------------------|------|------|------------|--------|------|
|                                   | M                | SD   | n    | M                   | SD   | n    | t          | p      | d    |
| <b>Females</b>                    |                  |      |      |                     |      |      |            |        |      |
| Childhood Trauma (20)             | 11.98            | 3.68 | 2207 | 9.82                | 4.18 | 476  | 10.44      | <0.001 | 0.57 |
| Other Stressors (17)              | 12.08            | 3.55 | 2277 | 9.24                | 4.25 | 464  | 13.49      | <0.001 | 0.77 |
| Psych. Diagnosis / Treatment (21) | 12.17            | 3.52 | 2045 | 9.90                | 4.19 | 694  | 12.84      | <0.001 | 0.61 |
| Low Social Support (19)           | 12.32            | 3.45 | 1757 | 10.11               | 4.13 | 918  | 13.89      | <0.001 | 0.52 |
| Low Resilience (22)               | 12.78            | 3.32 | 447  | 11.32               | 3.94 | 2202 | 8.38       | <0.001 | 0.38 |
| <b>Males</b>                      |                  |      |      |                     |      |      |            |        |      |
| Childhood Trauma (20)             | 11.87            | 3.77 | 250  | 10.13               | 3.99 | 77   | 3.40       | <0.001 | 0.46 |
| Other Stressors (17)              | 11.85            | 3.66 | 278  | 9.49                | 4.38 | 57   | 3.81       | <0.001 | 0.62 |
| Psych. Diagnosis / Treatment (21) | 12.51            | 3.34 | 226  | 9.25                | 4.03 | 108  | 7.30       | <0.001 | 0.91 |
| Low Social Support (19)           | 12.38            | 3.51 | 210  | 9.68                | 3.94 | 118  | 6.18       | <0.001 | 0.74 |
| Low Resilience (22)               | 11.22            | 3.97 | 62   | 11.94               | 3.49 | 262  | 1.41       | 0.16   | 0.18 |

Notes: All *p*'s as reported are uncorrected and 2-tailed; the Bonferroni-corrected  $p < .05$  is equivalent to  $0.05/5 = 0.01$  for separate families of tests (in males vs. females). GPS Item number in brackets (20 / 17 / 21 / 19 / 22). Psych. = Psychiatric.

**Table 3**

Descriptive statistics and group comparisons between those who did vs. did not endorse a history of childhood trauma on the GPS in response to the overall applicability of CARTS subscale ratings.

|                 | With Childhood Trauma History on GPS |      |      | Without Childhood Trauma History on GPS |       |     | Statistics |        |      |
|-----------------|--------------------------------------|------|------|---|-------|-----|------------|--------|------|
|                 | M                                    | SD   | n    | M                                       | SD    | n   | t          | p      | d    |
| <b>Females</b>  |                                      |      |      |   |       |     |            |        |      |
| Positive        | 1.31                                 | 2.45 | 2197 | 1.23                                    | 2.29  | 471 | 0.74       | 0.48   | 0.04 |
| Secure          | 2.01                                 | 2.83 | 2158 | 1.83                                    | 2.72  | 464 | 1.30       | 0.20   | 0.07 |
| P-Affect        | 0.17                                 | 0.38 | 2076 | 0.16                                    | 0.37  | 445 | 0.65       | 0.52   | 0.03 |
| N-Affect        | 0.20                                 | 0.55 | 2191 | 0.45                                    | 0.085 | 461 | 6.23       | <0.001 | 0.42 |
| N-Feelings From | 0.18                                 | 0.59 | 2194 | 0.52                                    | 1.08  | 461 | 6.57       | <0.001 | 0.49 |
| N-Beliefs From  | 0.81                                 | 1.40 | 2182 | 1.73                                    | 1.97  | 456 | 9.54       | <0.001 | 0.61 |
| N-Beliefs To    | 1.13                                 | 1.64 | 2150 | 1.99                                    | 2.01  | 448 | 8.51       | <0.001 | 0.50 |
| E-Ab to Self    | 0.24                                 | 0.59 | 2139 | 0.61                                    | 0.83  | 439 | 8.93       | <0.001 | 0.59 |
| E-Ab to Others  | 0.41                                 | 0.74 | 2093 | 0.72                                    | 0.88  | 430 | 6.76       | <0.001 | 0.40 |
| P-Ab to Self    | 0.65                                 | 0.78 | 2074 | 1.16                                    | 0.84  | 420 | 11.42      | <0.001 | 0.64 |
| P-Ab to Others  | 0.74                                 | 0.85 | 2035 | 1.24                                    | 0.85  | 402 | 10.67      | <0.001 | 0.58 |
| Bad Things      | 1.27                                 | 1.27 | 2051 | 2.39                                    | 1.02  | 403 | 19.30      | <0.001 | 0.91 |
| S-Ab            | 3.76                                 | 2.61 | 1938 | 5.49                                    | 1.44  | 397 | 18.45      | <0.001 | 0.70 |
| <b>Males</b>    |                                      |      |      |   |       |     |            |        |      |
| Positive        | 1.28                                 | 2.72 | 247  | 1.62                                    | 2.74  | 77  | 0.96       | 0.34   | 0.13 |
| Secure          | 1.79                                 | 2.80 | 238  | 2.04                                    | 3.00  | 76  | 0.65       | 0.52   | 0.09 |
| P-Affect        | 0.15                                 | 0.35 | 226  | 0.22                                    | 0.41  | 74  | 1.31       | 0.19   | 0.19 |
| N-Affect        | 0.20                                 | 0.53 | 247  | 0.35                                    | 0.76  | 75  | 1.53       | 0.13   | 0.24 |
| N-Feelings From | 0.22                                 | 0.65 | 246  | 0.63                                    | 1.19  | 75  | 2.80       | 0.006  | 0.50 |
| N-Beliefs From  | 0.95                                 | 1.64 | 244  | 1.87                                    | 1.96  | 72  | 3.57       | <0.001 | 0.53 |
| N-Beliefs To    | 1.15                                 | 1.80 | 239  | 2.09                                    | 2.03  | 69  | 3.45       | <0.001 | 0.50 |
| E-Ab to Self    | 0.33                                 | 0.70 | 233  | 0.72                                    | 0.91  | 68  | 3.26       | 0.002  | 0.52 |
| E-Ab to Others  | 0.45                                 | 0.79 | 227  | 0.86                                    | 0.94  | 66  | 3.26       | 0.002  | 0.50 |
| P-Ab to Self    | 0.49                                 | 0.74 | 234  | 1.05                                    | 0.81  | 66  | 4.99       | <0.001 | 0.74 |
| P-Ab to Others  | 0.70                                 | 0.86 | 221  | 1.40                                    | 0.75  | 63  | 6.26       | <0.001 | 0.83 |
| Bad Things      | 1.27                                 | 1.31 | 219  | 2.51                                    | 0.82  | 63  | 9.11       | <0.001 | 1.02 |
| S-Ab            | 3.88                                 | 2.67 | 190  | 5.70                                    | 1.01  | 61  | 7.83       | <0.001 | 0.77 |

Notes: All  $p$ 's as reported are uncorrected and 2-tailed; the Bonferroni-corrected  $p < .05$  is equivalent to  $0.05/13 = 0.004$  for separate families of tests (in males vs. females). Higher scores reflect increasing non-applicability of the CARTS items, that is, the respondent did not consider any person in their family to be described by the set of items. For example, a higher score on the "Positive" subscale is interpreted as an indication that no family member could be described as having "Positive" characteristics (as a risk factor), while a higher score on the "E-Ab to Self" (Emotional Abuse to Self) subscale would be interpreted as an indication that no family member could be described as being emotionally abusive toward the participant (as a protective factor). P-Affect = Positive Affect, N-Affect = Negative Affect, N-Feelings = Negative Feelings, N-Beliefs = Negative Beliefs, E-Ab = Emotional Abuse, P-Ab = Physical Abuse, S-Ab = Sexual Abuse. Sample size ( $n$ ) varies by CARTS subscale due to a small number of participants choosing not to answer certain questions.

( $0.40 \leq d \leq 0.91$ ) and males ( $0.50 \leq d \leq 1.02$ ), those who endorsed the GPS childhood trauma screening item also endorsed a higher expression of negative affective traits within their families, a greater expression of negative feelings from family members toward the respondent (only among females), a higher number of negative relational beliefs toward and perceived in return from their family members, a higher incidence of emotionally and physically abusive behaviour directed toward them and others in their family, as well as having been possibly or explicitly sexually abused. In summary, the GPS childhood trauma screening item was significantly correlated with response to 10 of the 13 subscales described in the original research and development of the CARTS (Frewen et al., 2013). Those who endorsed the GPS screening item, however, did not report a differential level of applicability for the 3 remaining CARTS subscales referring to positive relational descriptions, positive affective descriptions, or attachment security, suggesting that these positively framed descriptions may be independent of the childhood trauma exposure that is measured by the GPS.

Of note, single-sample  $t$ -tests also demonstrated that, across females and males, an overall higher number of GPS symptoms were reported by the current sample ( $M = 11.58$ ,  $SD = 3.84$ ,  $N = 3129$ ) than were reported by the GPS normative group ( $M = 7.99$ ,  $SD = 4.78$ ,  $N = 8741$ )  $t(3091) = 52.01$ ,  $p < .001$ ,  $d = 0.93$ . This finding held true both in the case of females ( $M = 11.61$ ,  $SD = 3.83$ ,  $n = 2754$  vs.  $M = 8.48$ ,  $SD = 4.66$ ,  $N = 6609$ ,  $t(2753) = 42.76$ ,  $p < .001$ ,  $d = 0.82$ ) and in the case of males ( $M = 11.43$ ,  $SD = 3.93$ ,  $n = 338$ , vs.  $M = 6.45$ ,  $SD = 4.80$ ,  $N = 2132$ ,  $t(337) = 23.31$ ,  $p < .001$ ,  $d = 1.27$ ). Further, while it can be deduced that females reported a higher number of GPS symptoms than did males within the normative sample from the GPS user-guide, females did not endorse an overall higher number of GPS symptoms than did males within the current sample,  $t(3090) = 0.79$ ,  $d = 0.05$ ,  $p = .22$ .

## 2.2. Childhood Attachment and Relational Trauma Screen (CARTS): Do adult males and females differ in their reported histories of parent-to-child childhood trauma and neglect?

Table 4 reports the results of comparing responses between the two biological sexes, through analysis of the overall non-endorsement of CARTS subscales independent of reference, and specifically in reference to each biological parent. In response to the overall applicability of CARTS items, we found that females and males differed only in regard to emotionally and physically abusive

**Table 4**  
Descriptive statistics and group comparisons between females and males in response to the CARTS subscale ratings for “Not Applicable”, and Biological Mother and Father.

|                                | Females |      |      | Males |      |     | Statistics |        |      |
|--------------------------------|---------|------|------|-------|------|-----|------------|--------|------|
|                                | M       | SD   | n    | M     | SD   | n   | t          | p      | d    |
| <b>Non-applicability</b>       |         |      |      |       |      |     |            |        |      |
| Positive                       | 1.31    | 2.42 | 2768 | 1.39  | 2.77 | 340 | 0.56       | 0.57   | 0.04 |
| Secure                         | 2.00    | 2.82 | 2720 | 1.83  | 2.85 | 329 | 1.02       | 0.31   | 0.06 |
| P-Affect                       | 0.17    | 0.38 | 2617 | 0.16  | 0.37 | 329 | 0.47       | 0.64   | 0.03 |
| N-Affect                       | 0.24    | 0.62 | 2752 | 0.23  | 0.60 | 337 | 0.18       | 0.85   | 0.01 |
| N-Feelings From                | 0.25    | 0.72 | 2755 | 0.31  | 0.82 | 336 | 1.40       | 0.16   | 0.09 |
| N-Beliefs From                 | 0.98    | 1.56 | 2738 | 1.17  | 1.76 | 332 | 1.88       | 0.06   | 0.12 |
| N-Beliefs To                   | 1.29    | 1.76 | 2697 | 1.36  | 1.88 | 324 | 0.58       | 0.56   | 0.04 |
| E-Ab to Self                   | 0.31    | 0.66 | 2673 | 0.42  | 0.77 | 315 | 2.56       | 0.01   | 0.17 |
| E-Ab to Others                 | 0.47    | 0.78 | 2622 | 0.54  | 0.84 | 308 | 1.39       | 0.17   | 0.09 |
| P-Ab to Self                   | 0.75    | 0.82 | 2589 | 0.61  | 0.79 | 315 | 2.92       | <0.01  | 0.17 |
| P-Ab to Others                 | 0.84    | 0.88 | 2532 | 0.87  | 0.89 | 297 | 0.43       | 0.67   | 0.03 |
| Bad Things                     | 1.47    | 1.30 | 2547 | 1.55  | 1.32 | 296 | 1.00       | 0.32   | 0.06 |
| S-Ab                           | 4.09    | 2.52 | 2425 | 4.36  | 2.48 | 262 | 1.68       | 0.09   | 0.11 |
| <b>Applicability to Mother</b> |         |      |      |       |      |     |            |        |      |
| Positive                       | 5.65    | 4.32 | 2668 | 6.56  | 4.52 | 325 | 3.45       | <0.001 | 0.21 |
| Secure                         | 2.54    | 2.89 | 2624 | 3.18  | 3.13 | 315 | 3.42       | <0.001 | 0.22 |
| P-Affect                       | 0.17    | 0.38 | 2528 | 0.23  | 0.42 | 300 | 2.35       | 0.02   | 0.16 |
| N-Affect                       | 1.56    | 1.02 | 2653 | 1.43  | 1.02 | 322 | 2.16       | 0.03   | 0.13 |
| N-Feelings From                | 2.34    | 1.58 | 2655 | 1.89  | 1.63 | 321 | 4.64       | <0.001 | 0.28 |
| N-Beliefs From                 | 1.97    | 1.97 | 2639 | 1.50  | 1.88 | 316 | 4.19       | <0.001 | 0.24 |
| N-Beliefs To                   | 1.05    | 1.63 | 2599 | 0.96  | 1.53 | 309 | 0.93       | 0.35   | 0.05 |
| E-Ab to Self                   | 0.88    | 0.92 | 2574 | 0.73  | 0.90 | 302 | 2.77       | <0.01  | 0.17 |
| E-Ab to Others                 | 0.73    | 0.90 | 2528 | 0.73  | 0.89 | 294 | 2.20       | 0.03   | 0.13 |
| P-Ab to Self                   | 0.60    | 0.71 | 2496 | 0.61  | 0.69 | 300 | 0.29       | 0.76   | 0.02 |
| P-Ab to Others                 | 0.47    | 0.72 | 2443 | 0.39  | 0.67 | 283 | 2.05       | 0.04   | 0.12 |
| Bad Things                     | 0.40    | 0.81 | 2457 | 0.42  | 0.80 | 281 | 0.43       | 0.64   | 0.03 |
| S-Ab                           | 0.08    | 0.58 | 2341 | 0.16  | 0.81 | 247 | 1.38       | 0.17   | 0.12 |
| <b>Applicability to Father</b> |         |      |      |       |      |     |            |        |      |
| Positive                       | 4.85    | 4.28 | 2448 | 4.50  | 4.33 | 303 | 1.35       | 0.18   | 0.08 |
| Secure                         | 1.46    | 2.34 | 2404 | 1.56  | 2.40 | 294 | 0.73       | 0.46   | 0.05 |
| P-Affect                       | 0.19    | 0.39 | 2317 | 0.22  | 0.42 | 285 | 1.23       | 0.22   | 0.08 |
| N-Affect                       | 1.01    | 0.94 | 2433 | 1.13  | 0.97 | 300 | 2.12       | 0.04   | 0.13 |
| N-Feelings From                | 2.33    | 1.59 | 2434 | 2.48  | 1.55 | 299 | 1.54       | 0.12   | 0.09 |
| N-Beliefs From                 | 1.71    | 1.82 | 2420 | 1.89  | 1.89 | 296 | 1.56       | 0.13   | 0.10 |
| N-Beliefs To                   | 1.32    | 1.80 | 2381 | 1.78  | 2.02 | 290 | 3.70       | <0.001 | 0.25 |
| E-Ab to Self                   | 0.70    | 0.88 | 2361 | 0.84  | 0.92 | 281 | 2.32       | 0.02   | 0.15 |
| E-Ab to Others                 | 0.78    | 0.90 | 2315 | 0.80  | 0.90 | 273 | 0.29       | 0.77   | 0.02 |
| P-Ab to Self                   | 0.49    | 0.68 | 2288 | 0.74  | 0.78 | 281 | 5.09       | <0.001 | 0.36 |
| P-Ab to Others                 | 0.60    | 0.79 | 2240 | 0.67  | 0.82 | 266 | 1.36       | 0.19   | 0.09 |
| Bad Things                     | 0.44    | 0.86 | 2250 | 0.51  | 0.90 | 262 | 1.23       | 0.22   | 0.08 |
| S-Ab                           | 0.31    | 1.12 | 2142 | 0.23  | 1.06 | 233 | 1.10       | 0.27   | 0.07 |

Notes: All *p*'s as reported are uncorrected and 2-tailed; the Bonferroni-corrected  $p < .05$  is equivalent to  $0.05/13 = 0.004$  for separate families of tests (in males vs. females). Within the upper tertile of rows, higher scores reflect increasing overall *non*-applicability of the CARTS items, that is, the respondent did not consider *any* person in their family to be described by the item. Comparably, the bottom two tertiles of rows refer to the applicability of items to each biological parent. P-Affect = Positive Affect, N-Affect = Negative Affect, N-Feelings = Negative Feelings, N-Beliefs = Negative Beliefs, E-Ab = Emotional Abuse, P-Ab = Physical Abuse, S-Ab = Sexual Abuse.

behaviours directed toward the self (see Table 2 for descriptive statistics). In these cases, it was found that females reported being more frequently the object of childhood emotional abuse than did males, whereas males reported being more frequently the object of childhood physical abuse than did females. Both sets of results, however, were of small effect size ( $d = 0.17$  in both cases).

Significant results were more numerous when responses particular to the biological mother and father were considered, albeit effect sizes remained small and continued to relate to a differential level of emotional vs. physical abuse experienced by females vs. males, respectively. Here, as compared with males, females reported that their biological *mothers* exhibited less positivity ( $d = 0.21$ ) and less attachment security ( $d = 0.22$ ), more frequently communicated negative feelings toward them ( $d = 0.28$ ), were more emotionally abusive toward them ( $d = 0.17$ ), and were believed to hold more negative relational beliefs toward them ( $d = 0.24$ ). In contrast, referring to biological *fathers*, as compared with females, males reported that their fathers exhibited more physically abusive behaviour toward them ( $d = 0.15$ ), and that they held more negative relational beliefs toward their fathers ( $d = 0.25$ ).

Finally, we assessed the strength of correlations between each of the CARTS subscales and the number of GPS symptoms endorsed, and whether or not the CARTS subscales were predictive of GPS symptom scores beyond only the GPS childhood trauma screening item. Analyses were again conducted separately in females and males to assess for possible biological sex differences in risk. In short, within females, whereas the GPS screening item for childhood trauma as a risk factor predicted nearly 5 % of the variance in GPS



transdiagnostic symptoms,  $\Delta R^2 = 0.049$ ,  $F(1, 1780) = 92.09$ ,  $p < .001$ , the CARTS overall applicability ratings predicted an incremental threefold increase of 17 % of the variance in GPS symptoms,  $\Delta R^2 = 0.166$ ,  $F(13,1767) = 28.81$ ,  $p < .001$ , while analysis of the CARTS applicability ratings that specifically referenced the biological parents contributed a yet further 4 % to the cumulative variance accounted for,  $\Delta R^2 = 0.035$ ,  $F(26,1741) = 3.08$ ,  $p < .001$ . In the final (third) step of the multiple regression, collinearity statistics indicated that tolerance (Range 0.256 to 0.835,  $M = 0.454$ ,  $Md = 0.415$ ,  $SD = 0.140$ ) and variance inflation factors (Range 1.198 to 3.907,  $M = 2.376$ ,  $Md = 2.408$ ,  $SD = 0.614$ ) were in acceptable limits of the assumptions of multiple regression.

In comparison, within males, the GPS screening item for childhood trauma as a risk factor again predicted nearly 5 % of the variance in GPS transdiagnostic symptoms,  $\Delta R^2 = 0.045$ ,  $F(1, 194) = 9.15$ ,  $p = .003$ , and the CARTS overall applicability ratings also predicted an even higher incremental increase of 24 % of the variance in GPS symptoms,  $\Delta R^2 = 0.237$ ,  $F(13,181) = 4.58$ ,  $p < .001$ . However, the CARTS applicability ratings that specifically referenced the biological parents failed to contribute a statistically significant increase in the cumulative variance accounted for,  $\Delta R^2 = 0.068$ ,  $F(26,155) = 0.63$ ,  $p = .92$ . Again, in the final (third) step of the multiple regression, collinearity statistics indicated that tolerance (Range 0.168 to 0.682,  $M = 0.331$ ,  $Md = 0.293$ ,  $SD = 0.124$ ) and variance inflation factors (Range 1.466 to 5.964,  $M = 3.394$ ,  $Md = 3.415$ ,  $SD = 1.087$ ) were in acceptable limits.

### 3. Discussion

Prior to the conduct of the current research, few studies had investigated biological sex differences in the long-term impact of childhood abuse and neglect on transdiagnostic mental health outcomes, especially studies comparing the outcomes of childhood maltreatment perpetrated by biological mothers vs. fathers. Several previous studies using the CARTS had documented differences in adults' reports of their childhood relationship with their biological parents across participant sexes, but no prior research had compared responses to the CARTS between females and males. Further, while the transdiagnostic mental health problems assessed by the GPS had already received rigorous investigation in recent studies (e.g., Frewen et al., 2021), no prior studies had investigated the GPS risk factors. The current project of the GC-TS therefore sought to address these gaps in the literature. The results of this study included that: 1) each of the risk factors assessed by the GPS were independently associated with increased transdiagnostic mental health outcomes, possibly with the exception of resilience in males; 2) the GPS childhood trauma screening item converged with but was incremented by the CARTS in predicting the same outcomes; and 3) a distinguishable and perhaps intuitive pattern of responses to the CARTS was obtained from males and females in characterizing differently their biological parents. Referring to the latter, females more frequently endorsed having emotionally abusive biological mothers while males more frequently endorsed having physically abusive biological fathers. This pattern of results was obtained in a sample of online respondents who generally endorsed an extremely high prevalence of histories of childhood abuse and neglect as well as other risk factors, and relatedly a significant burden of transdiagnostic mental health problems. We briefly elaborate on each finding in turn.

#### 3.1. Are the 5 risk factors screened by the GPS associated with increased transdiagnostic mental health problems in adults?

Previous research had investigated response to the 17 transdiagnostic mental health symptoms that comprise the GPS (e.g., Frewen et al., 2021) but not the 5 risk factor items, leaving the validity of the latter as screening measures uncertain beyond their face value. Importantly, we failed to substantiate the validity of a general summation score across the five risk factors screened by the GPS due to low internal consistency, suggesting that each of the screening items should be analyzed independently. Doing so, each of the risk factors were found to associate with transdiagnostic mental health outcomes within the range of a medium effect size in both females and males, excepting that self-reported non-resilience was not found to be a risk factor among males and was also found to be of a lower effect size in females. These results occurred despite the current samples' very high endorsement of each of the risk factors: approximately 5:1 endorsed histories of childhood trauma and the occurrence of recent life stressors, approximately 3:1 reported having a psychiatric diagnosis or receiving treatment for psychological problems, and approximately 2:1 reported a lack of social support in their current life circumstances.

To be clear, our findings demonstrating that histories of childhood trauma, recent life stressors, past mental health problems, and low social support are each risk factors for current mental health problems are not novel findings; we recognize that each of these risk factors are well established in the literature. However, to our knowledge, the measurement of these levels of risk by the GPS had up until now never been validated. The current findings thus support the GPS as a psychometric screening tool for measuring not only various transdiagnostic mental health outcomes of trauma but also differential levels of risk for the same outcomes. However, we recommend to evaluate each risk factor independently rather than considering only an overall level of risk based on the sum of all risk factors.

In the context of such a high level of risk, it is perhaps less surprising that, despite endorsing an overall high frequency of transdiagnostic mental health problems, the majority (approximately 5:1) of participants also described themselves as resilient. Further, specifically among females, those that did not describe themselves as resilient were more likely to endorse a higher number of mental health outcomes, albeit with a lower effect size. Our findings of the high prevalence of resilience are comforting, perhaps relating to high perceived self-efficacy in coping skills as well as hope and positive expectancies for the future (Gallagher et al., 2020). Nevertheless, such results may in turn relate to the fact that most of the current sample were well educated and gainfully employed, posing possible limits of generalizability to persons from a different sociodemographic. More research including administering the GPS risk factors among less economically privileged groups will be needed in the future, as well as those who perceive themselves to be non-resilient. Further, more research examining the relative risk of various additional vulnerability and protective factors for transdiagnostic outcomes among adults who were maltreated as children is needed, including by comparing factors at the level of the

individual, family, and broader community and society, especially among persons with histories of emotional abuse and neglect; the impact of childhood trauma may be further exacerbated in the presence of additional risk factors such as low social support, recent life stressors, and low perceived coping and resiliency.

Altogether, our results serve to validate each of the GPS risk factors in their relation to elevated transdiagnostic mental health outcomes and encourage further use of the GPS as a brief screening tool not only of transdiagnostic psychological problems but also of some of the likely risk factors that give rise to such problems. Interestingly though, it may be that each risk factor contributes relatively independently to mental health outcomes and that a simple count score of the number of risk factors present may not be a valid means of summarizing a person's overall level of risk. It therefore seems important to take account of which of a number of different risk factors are present for each person, rather than only summarizing across such distinctions and attending only to an overall cumulative level of risk; further research along these lines is recommended.

We also assessed the convergent validity of the GPS childhood trauma screening item in reference to the CARTS and found that those that affirmed a history of childhood trauma on the GPS were also those more likely to endorse a similar history on the CARTS, thus providing additional convergent validity for the GPS childhood trauma screen. However, response to the CARTS was found to significantly increment over the GPS childhood trauma screen in predicting the transdiagnostic mental health outcomes it also assesses. We therefore recommend as a clinical application using the GPS as an initial, rapid screening for childhood trauma history that is then followed up with further assessment via the CARTS to provide a more detailed and relationally contextualized description of any early life adversity that occurred for a person within and outside of the family.

### 3.2. Do adult males and females differ in their reported histories of parent-to-child childhood trauma and neglect?

The current study distinguished responses to the GPS and CARTS that were collected from males versus females regarding relational experiences with their biological parents during childhood and adolescence. In short, we found that females reported being more frequently the object of childhood emotional abuse, especially as perpetrated by their biological mothers, whereas males reported being more frequently the object of childhood physical abuse, especially as perpetrated by their biological fathers.

These results contrast with the surprising observations recently reported in Israeli (Mehlhausen-Hassoen, 2022) and Chinese (Cui et al., 2016, 2018) populations that highlighted the prevalence of maternal physical aggression, which may bespeak the relevance of cross-cultural analyses in our efforts to understand perpetrator characteristics. While cross cultural analyses of the CARTS have been previously undertaken (Leuchter et al., 2021; Simonelli et al., 2017), no prior studies compared responses between females and males. We thus followed the framework of Mehlhausen-Hassoen (2022) to analyze responses as a function of both child and parent biological sex, which provides a useful heuristic to contextualize future analyses of the CARTS and other measures of parental maltreatment of children gathered in various languages.

It also deserves note that biological sex differences were not found in the overall burden of GPS transdiagnostic mental health problems, presumably owing to the very high overall trauma and symptom burden endorsed by both females and males within the current sample, who may have self-selected to participate in the study due to such history upon visiting the GC-TS website. As a reminder, our study expressly invited participants to complete surveys about childhood relationships with family members, including those that were relationally traumatic in nature, thus likely lending itself to a self-selection bias favoring a high degree of participation from persons who endorsed histories of childhood trauma and neglect.

### 3.3. Limitations and future directions

Results from the current study should be interpreted in light of our study limitations. Fewer males than females participated, limiting confidence in some of the results observed for males. We also failed to assess non-binary gender identifications that may have revealed different patterns of results than we have detailed herein for biological sex. This limitation refers to both participants' own self-identifications, the genders to which participants refer to their biological parents, and the parents' own gender self-identifications. A further major limitation of the current analysis is that it was limited only to biological parents; additional studies are needed to follow-up other relationship types, for example, adoptive parents (e.g., Hornfeck et al., 2019; Nalavany et al., 2008). While the CARTS provides for an inclusive approach to screening regarding the quality of early childhood relationships, for example, not only asking about relationships with primary caregivers but also secondary caregivers and both familial and non-familial relationships (e.g., Frewen et al., 2015), some research has emphasized the particularly strong influence of relationships with primary caregivers on long-term adult mental health outcomes (e.g., Nowalis et al., 2022) and so was the focus herein.

Besides our study limitations in relation to the important conceptual differences between biological sex and gender, our study exhibits several general limitations. Our participant data is retrospective and self-report in nature and therefore subject to recall and desirability biases resulting in potential over and under reporting of trauma exposure and associated transdiagnostic mental health outcomes. Further, our results cannot infer trends in the general population as this study cohort exhibited abnormally high levels of childhood trauma exposure, other risk factors, and transdiagnostic mental health problems. This was presumably due to the recruitment approach from the GC-TS website, a website focusing on psychotrauma and therefore perhaps biased toward online visitors who may be positive for childhood traumatic histories and posttraumatic mental health problems. Further limiting generalizability is the fact that the ethnic diversity within our study was limited by the over-representation of White persons, and such limitations require resolution in future research conducted on participants with other demographic distributions. The GPS was also administered prior to the CARTS in all cases, which may produce an order effect. We also limited our analysis of responses to the CARTS to responses describing biological parents and the original 13 subscales described by Frewen et al. (2013). As a result, we

cannot comment on response to other relationship types and content that have been the subject of prior research, for example, responses to siblings, other familial, and non-familial perpetrators and non-perpetrators of childhood maltreatment (e.g., Frewen et al., 2015). Moreover, as already noted, we cannot comment on the comparison between relationships that are biologically (or genetically) related to vs. unrelated to the participant. While beyond the scope of the present endeavor, such investigations represent relevant future research directions. Finally, regrettably, we did not include any formal measures for distinguishing between real participants and “bots”. We should note, however, that given that there was no reimbursement for completion of our study surveys, it seems unlikely that motivation to construct bots to answer our surveys would be high. In addition, the CARTS itself, due to its visual displays and laboured response format of pointing and clicking multiple stick-figure icons, would be inherently difficult for bots to navigate.

#### 4. Conclusion

Childhood abuse and neglect appears to confer increased risk for long-term transdiagnostic mental health outcomes in both biological sexes, but the two biological sexes appear to be at differential levels of risk for specific types of maltreatment as perpetrated by each of their biological parents. Specifically, females more frequently endorsed having emotionally abusive biological mothers, while males more frequently endorsed having physically abusive biological fathers. While the present research provides further support for use of the CARTS and GPS in screening for childhood maltreatment and other risk factors for transdiagnostic mental health outcomes in English speaking populations, much work remains to be done in other languages and with diverse cultural backgrounds and persons identifying with non-binary gender if we are to fully appreciate and ultimately reduce the global mental health burden of all persons who have experienced childhood trauma and neglect.

#### Data availability

The data that has been used is confidential.

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