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2 Sex and age differences in ICD-11 PTSD and Complex PTSD: An analysis of four general
3 population samples
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Abstract

Background. Posttraumatic stress disorder (PTSD) is traditionally understood as a disorder that occurs more commonly in women than in men, and in younger age groups than in older age groups. The objective of this study was to determine if these patterns are also observed in relation to ICD-11 PTSD and Complex PTSD (CPTSD).

Methods. Secondary data analysis was performed using data collected from three nationally representative samples from the Republic of Ireland ($N = 1,020$), the United States ($N = 1,839$) and Israel ($N = 1,003$), and one community sample from the United Kingdom ($N = 1,051$).

Results. Estimated prevalence rates of ICD-11 PTSD were higher in women than in men in each sample, and at a level consistent with existing data derived from DSM-based models of PTSD. Furthermore, rates of ICD-11 PTSD were generally lower in older age groups for men and women. For CPTSD, there was inconsistent evidence of sex and age differences, and some indication of a possible interaction between these two demographic variables.

Conclusions. Despite considerable revisions to PTSD in ICD-11, the same sex and age profile was observed to previous DSM-based models of PTSD. CPTSD, however, does not appear to show the same sex and age differences as PTSD. Theoretical models that seek to explain sex and age differences in trauma-related psychopathology may need to be reconsidered given the distinct effects for ICD-11 PTSD and CPTSD.

Key words: PTSD; Complex PTSD; ICD-11; sex; age.

64 Sex and age differences in ICD-11 PTSD and Complex PTSD: An analysis of four general
65 population samples

66 There are two systems used by mental healthcare professionals to diagnose trauma-
67 related disorders: the fifth edition of the *Diagnostic and Statistics Manual of Mental*
68 *Disorders* [DSM-5; 1] and the 11th version of the *International Classification of Diseases*
69 [ICD-11; 2]. The former describes Posttraumatic Stress Disorder (PTSD) using 20 symptoms
70 categorised into four clusters (Intrusions, Avoidance, Negative Alterations in Cognitions and
71 Mood (NACM), and Hyperarousal), while the latter includes two related-but-distinct
72 disorders of PTSD and Complex PTSD (CPTSD). ICD-11 PTSD includes six symptoms
73 distributed across three clusters (Reexperiencing in the here and now, Avoidance, and Sense
74 of Threat) and ICD-11 CPTSD includes 12 symptoms; the six PTSD symptoms and six
75 ‘Disturbance in Self-Organisation’ (DSO) symptoms which are distributed across three
76 symptom clusters (Affect Dysregulation, Negative Self Concept, and Difficulties in
77 Relationships). Thus, DSM-5 includes a broad array of trauma-specific and non-specific
78 symptoms under a single diagnostic category, while ICD-11 distinguishes trauma-specific
79 and non-specific symptoms into discrete diagnostic categories, each with a narrow set of
80 symptom indicators. Decades of research with DSM-based models indicates that PTSD is
81 more common among females than males, and among younger rather than older cohorts,
82 however, it is unknown whether these sex and age differences occur with respect to ICD-11
83 PTSD and CPTSD.

84 Epidemiological research with DSM-IV [3] and DSM-5 [1] models of PTSD
85 consistently found that women were about twice as likely as men to meet diagnostic criteria
86 for PTSD [4-7], even when controlling for differences in trauma type, diagnostic measures,
87 culture, measurement error, reporting bias, and file drawer effects [4, 7-9]. A study with
88 Danish bank employees exposed to several robberies found that a combination of pre-, peri-

114 informed consent. The Israeli and US data were collected in 2017, the UK data in 2018, and
115 the Irish data in 2019. Ethical approval for the collection of each dataset, and use for
116 secondary analyses, was obtained by the various study authors from their respective
117 institutions. Ethical approval for this study was provided to the first author by the Social
118 Research Ethics Committee at Maynooth University.

119 The US sample ($N = 1,839$) was a nationally representative, probability-based sample
120 of adults aged 18-70 years. In addition to the inclusion criteria previously mentioned,
121 participants were also selected if they had experienced at least one traumatic life event.
122 Furthermore, females and ethnic minority groups (African American and Hispanic) were
123 oversampled, each at a 2:1 ratio. 3,953 people were contacted and 1,839 met the inclusion
124 criteria (participation rate = 46.3%). These data were weighted to take account of all
125 inclusion criteria and ensure representativeness to the entire US adult population. Further
126 details can be found in Cloitre et al. [32].

127 The Irish ($N = 1,020$) and Israeli ($N = 1,003$) samples were nationally representative,
128 non-probability-based adult samples. Quota sampling methods were used to construct
129 samples that represented the respective populations in relation to several demographic
130 variables (i.e., age, sex, and regional distribution). All Israeli participants were trauma-
131 exposed [31] while 82.3% of the Irish participants met the DSM-5's Criterion A trauma
132 exposure criterion [34] Further details about these samples can be found in Ben-Ezra et al.
133 [31] and Hyland et al. [34].

134 The UK sample ($N = 1,051$) was a community sample of trauma-exposed adults.
135 Exposure to a traumatic life event was an inclusion criterion, and although age and regional
136 quotas were used to select sample participants, this sample was not constructed to be
137 nationally representative. Further details about this sample can be found in Karatzias et al.
138 [33]. Table 1 presents the sociodemographic characteristics for each sample.

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Table 1 here

140 **Materials**

141 Trauma exposure: The Life Events Checklist for DSM-5 [34] (LEC-5) was used to
142 screen for traumatic exposure in the US, Israeli, and UK samples. The LEC-5 includes
143 descriptions of 16 traumatic life events and participants were asked to indicate if they had
144 experienced each event on a ‘Yes’ (1) or ‘No’ (0) basis. The International Trauma Exposure
145 Measure (ITEM) [35] was used to screen for traumatic exposure in the Irish sample. The
146 ITEM was developed to capture traumatic exposure in a manner that is consistent with the
147 ICD-11’s broader definition of a traumatic event (i.e., any event of an extremely threatening
148 or horrific nature). It includes descriptions of 21 events, 16 of which meet the DSM-5’s
149 definition of a traumatic event and five that meet the ICD-11, but not DSM-5, definition (i.e.,
150 stalking, bullying, emotional abuse, emotional neglect, and physical neglect). To ensure
151 consistency across all samples, in this study we only used the 16 events from the ITEM that
152 match the DSM-5 definition of trauma. These events map onto the 16 events in the LEC-5.
153 Thus, diagnostic rates for all samples are reported based on a traumatic exposure criterion
154 that is in-line with the DSM-5’s Criterion A definition.

155 PTSD and CPTSD: All samples completed the International Trauma Questionnaire
156 [37]. This 12-item, self-report measure was designed to capture all elements of the ICD-11
157 diagnostic criteria for PTSD and CPTSD. Respondents first identify their most distressing
158 traumatic event and indicate how long ago it occurred. Respondents are then instructed to
159 answer all questions in relation to this event. Six items measure PTSD symptoms, and these
160 items are answered in terms of how much the respondent has been bothered in the past
161 month. Three questions measure functional impairment associated with these symptoms in
162 the domains of social, occupation, and other important areas of life. A further six items
163 measure the DSO symptoms, and these are answered in terms of how respondents typically

164 feels, think about themselves, and relates to others. There are three items that measure
165 functional impairment associated with these symptoms too. All items are based on a five-
166 point Likert scale from 0 (*Not at all*) to 4 (*Extremely*), and a symptom is considered to be
167 present based on a score of ≥ 2 (*Moderately*). The internal reliability (Cronbach's alpha)
168 estimates of the subscale scores in each sample were all greater than $\alpha = .90$.

169 To meet diagnostic criteria for PTSD or CPTSD, a person must have experienced at
170 least one traumatic event. For a diagnosis of PTSD, at least one symptom must be present
171 from each PTSD cluster, and at least one indicator of functional impairment associated with
172 these symptoms must be endorsed. To meet diagnostic criteria for CPTSD, at least one
173 symptom must be present from the six symptom clusters, and endorsement of functional
174 impairment associated with the PTSD and DSO symptoms must be present. As per the ICD-
175 11 diagnostic guidelines, a person may only be diagnosed with PTSD or CPTSD, but not
176 both. If a person meets the diagnostic criteria for CPTSD, they do not also receive a diagnosis
177 of PTSD. Diagnostic rates presented in this study represent those from the finalised version
178 of the ITQ, and consistent with the ICD-11 diagnostic algorithms.

179 **Statistical analysis**

180 Binary logistic regression analysis was used to determine if there were statistically
181 significant differences in the estimated prevalence rates of PTSD and CPTSD across the
182 sexes, and across six age categories (18-24, 25-34, 35-44, 45-54, 55-64, and 65 and older).
183 These age categories were used because these were the age bands employed by the various
184 survey companies to establish sample quotas. Odds ratios (OR) with 95% confidence
185 intervals were estimated to quantify the magnitude of the sex and age differences. For sex,
186 males were used as the reference category, and for age, those aged 65 years and older were
187 used as a reference category.

188 **Results**

214 PTSD, there was a consistent trend of lower rates in the older age groups for both sexes. This
215 was not the case for CPTSD. In the Irish and US samples, rates of CPTSD for women were
216 highest in the middle age groups, and lowest in the youngest and oldest age groups, whereas
217 in the Israeli and UK samples, rates were lowest for women in the oldest age groups. For
218 males, one notable trend was that rates of CPTSD were relatively higher in those aged 65+ in
219 the Irish and Israeli samples.

220 Figure 3 here

221 Discussion

222 PTSD is normally understood as a disorder more common in women than in men, and
223 in younger adults than in older adults. With ICD-11, PTSD was reconceptualised as a narrow,
224 fear-based disorder, and CPTSD was introduced into the diagnostic nomenclature for the first
225 time, sparking considerable research attention [38-39]. This necessitated a reassessment of
226 common assumptions about sex and age differences in trauma-related psychopathology. We
227 set out to explore these issues by re-analysing data from four independent, general population
228 samples. Our findings suggest that ICD-11 PTSD follows the same general sex and age
229 profile as the DSM-based models of PTSD, while CPTSD does not.

230 In each sample, women had higher rates of PTSD than men, and the magnitude of
231 these differences were consistent with previous epidemiological research using DSM models
232 of PTSD [4-8]. We found that women were approximately two- to two-and-a-half times more
233 likely than men to meet diagnostic criteria for ICD-11 PTSD. This is in-line with the well-
234 established 2:1 ratio of PTSD in women compared to men [5]. So, even though PTSD is
235 defined by a much narrower set of symptoms than in DSM-IV and DSM-5 – 11 and 14 fewer
236 symptoms, respectively – the same sized sex differences in meeting diagnostic criteria appear
237 to remain.

238 In contrast, in three of the four samples there were no differences in rates of CPTSD
239 between men and women. Only in the US sample were women significantly more likely than
240 men to meet criteria for CPTSD, with women being nearly two times more likely than men to
241 meet diagnostic criteria. Prior to the introduction of ICD-11, sex differences in PTSD had
242 been proposed to be due to a multitude of biopsychosocial factors including sex differences in
243 neuroendocrine functioning following early life trauma, perceptions of threat and loss of
244 control, peritraumatic dissociation, social isolation, and social support following traumatic
245 experiences [5], and it had been suggested that these factors may also give rise to the same
246 sex differences in ICD-11 CPTSD [31]. This appears not to be the case. It is unclear,
247 however, why factors such as these would lead to sex difference in PTSD but not in CPTSD.
248 One possibility for the observed effects could be methodological; namely that the PTSD
249 items are biased such that women are more likely to endorse these symptoms compared to
250 men, irrespective of their underlying levels of PTSD distress. However, this seems unlikely
251 given that a recent comprehensive assessment found no evidence of differential item
252 functioning based on sex for the six symptoms of ICD-11 PTSD [40]. If the current findings
253 of sex differences in rates of PTSD but not CPTSD are evidenced in future general
254 population surveys, a theoretical account of why such effects should occur will be required.
255 Establishing the underlying mechanisms that contribute to higher PTSD prevalence rates in
256 females is critical to improving treatment and prevention, globally. In doing so, this will also
257 improve sex- and gender-specific approaches to helping those affected by trauma as well as
258 gender-sensitive outreach, engagement, and intervention programs [11].

259 In terms of age differences in the rates of PTSD, there was only a statistically
260 significant effect observed in the US sample, however, and as illustrated in Figure 1, there
261 was a clear of lower rates of PTSD in the older age groups. This pattern is consistent with
262 existing data from DSM-based models of PTSD, and with research on the prevalence of other

263 psychiatric disorders across the lifespan [12]. Thus, we may say with some confidence that
264 ICD-11 PTSD is like DSM-based PTSD in that prevalence rates are higher in younger age
265 groups than in older age groups. Interestingly, quite a different pattern emerged for CPTSD.
266 As illustrated in Figure 2, in the UK sample there was the typical profile of the highest rates
267 in the youngest age groups and the lowest rates in older age groups. There was also some
268 evidence of this in the Israeli sample (e.g., a drop from 7.5% in those aged 18-14 to 3.2% in
269 those aged 65 and older). However, in the Irish sample, rates of CPTSD were lowest in those
270 aged 25-34 and highest in those aged 44-54. In the US sample, rates of CPTSD were lowest
271 amongst those aged 18-24 and highest in those aged 44-54 years.

272 Many theories have been proposed to account for decreasing rates of PTSD in older
273 age. Compared to younger adults, when faced with adverse situations and stressful events
274 older adults are generally more resilient and have greater cognitive reappraisal capacities [23-
275 25, 28]. Theories such as the socioemotional selectivity theory suggest that older adults seek
276 emotionally meaningful goals and select familiar social partners which decreases the
277 likelihood of experiencing stressful situations and increases positive experiences [12]. It has
278 also been suggested that old age is associated with spending more time in quiet reflection, a
279 decreased interest in superfluous social interactions, and acceptance of earlier life events [41].
280 Furthermore, there have been contrasting arguments asserting that older adults may be more
281 reluctant to acknowledge mental health concerns due to fears of stigma and to convey their
282 psychological concerns as somatic complaints [18-22]; to under report symptoms due to
283 cognitive impairment [28]; and to possibly reflect a survivor bias where older adults are far
284 less likely to survive until old age with a PTSD diagnosis [19, 42]. Additionally, there have
285 been concerns regarding the accuracy of psychiatric assessments in older adults given that
286 older adults may not fit easily into our existing disorder classification systems [43]. As with
287 the discussion of sex differences, why these processes would lead to lower rates of PTSD in

288 older age but not in CPTSD is unclear. One possibility is that because CPTSD is more likely
289 to occur following early developmental trauma and/or multiple traumatization [33, 34, 44]
290 and is associated with greater comorbidity and difficulties in functioning than PTSD [33, 45]
291 it may remit as commonly as PTSD in older age.

292 When age differences in rates of PTSD and CPTSD were examined separately for
293 men and women, we found that the general pattern of lower rates of PTSD in older age
294 groups was present for men and women. Thus, there appears to be little evidence of any
295 interaction between sex and age in relation to PTSD. As such, it may be said with reasonable
296 confidence that women are at higher risk of PTSD than men irrespective of age, and that rates
297 of PTSD are generally higher in younger age groups irrespective of sex. In the case of
298 CPTSD, however, there were signs of an interaction between sex and age. For example, in
299 Ireland, rates of CPTSD in women followed an n-shaped distribution peaking in the middle-
300 aged groups whereas for men, rates of CPTSD were elevated in those 18-24, were lower in all
301 age groups up to those aged 55-64, and then were at their highest in those aged 65 and older.
302 A similar pattern was evident in the US sample save for the high rates of CPTSD in men over
303 65; an effect that may be due to the fact that the US sample only included adults up to the age of
304 70. In Israeli, rates of CPTSD for men and women were similar for every age group before a
305 stark difference becoming evident in those aged 65 and older where men had considerably
306 higher rates. Almost the opposite pattern was evident in the UK where rates of CPTSD were
307 starkly different between men and women aged 18-24 and were then very similar among the
308 middle- older-aged groups. Consequently, these findings suggest that rates of CPTSD at
309 different ages may depend on one's sex.

310 These findings should be considered in light of some limitations. The four samples
311 were drawn from high-income countries and findings may not generalise to other nations.
312 The use of general population samples means that these findings may not generalise to

313 clinical populations. Relatedly, only the US sample was a probability based nationally
314 representative sample. The sample sizes were relatively small when attempting to categorise
315 people into different age groups, and this likely increased the risk of Type 2 errors when
316 testing for age differences. Finally, the cross-sectional nature of the sample means that it is
317 impossible to disentangle age versus cohort effects. We may only conclude that rates differ
318 across age groups but not those rates change because of the aging process.

319 In conclusion, we found consistent evidence that rates of ICD-11 PTSD were higher
320 in women than in men, and at a level that was consistent with existing data derived from
321 DSM-based PTSD research. Moreover, also in-line with DSM-based research, rates of ICD-
322 11 PTSD followed a general trend of decreasing frequency in older age for both men and
323 women. The picture for CPTSD was quite distinct with inconsistent evidence of sex and age
324 differences, and some indication of an interaction between these two demographic variables.
325 More research is required to understand the epidemiology of CPTSD, and theoretical models
326 of sex and age differences in trauma-related psychopathology may need to be reconsidered in
327 light of distinct effects for PTSD and CPTSD.

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331 **Conflicts of interest:**

332 All authors have no conflict of interest to declare.

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334 **Data Availability Statement:**

335 The data that support the findings of this study are available from the corresponding author

336 upon reasonable request.

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Table 1

Demographic characteristics of each sample.

	Ireland (N = 1020)	United States (N = 1839)	Israel (N = 1003)	UK (N = 1051)
Age, Mean (SD)	43.10 (15.2)	44.51 (14.5)	40.62 (14.5)	47.13 (14.9)
Age range	18-87	18-70	18-70	18-90
Age bands (%)				
18-24	12.3	10.0	15.9	5.1
25-34	20.2	20.7	25.8	21.0
35-44	23.5	19.0	19.8	18.3
45-54	29.2	18.5	16.5	21.6
55-64	14.1	21.6	15.8	19.7
65+	10.8	10.2	6.3	14.3
Sex (%)				
Men	49	48	48.3	31.6
Women	51	52	51.7	68.4
Relationship status (%)				

Not in a committed relationship	30.5	36.6	29.5	29.6
In a committed relationship	69.5	63.4	70.5	70.4
Highest level of education (%)				
Primary school or less	7.1	9.1	2.5	1.7
High school/secondary school	39.2	28.7	29.1	35.7
College/University	36.9	30.3	68.4	62.7
Postgraduate*	16.9	31.8	-	-
Employment (%)				
Full-time	45.8	71.1	61.8	36.1
Part-time	17.8	-	20.9	19.2
Voluntary work*	-	-	-	3.2
Unemployed, seeking work	8.6	5.6	6.3	7.1
Unemployed, not seeking work	27.7	23.3	11.0	34.3

*items regarding post-graduate qualification and voluntary work were not included in demographic questions for countries with blank spaces.

Table 2

Sex differences in estimated prevalence rates of ICD-11 PTSD and CPTSD using binary logistic regression.

	PTSD % (n)	Males % (n)	Females % (n)	OR (95% CI)	CPTSD % (n)	Males % (n)	Females % (n)	OR (95% CI)
Ireland	5.0 (51)	3.6 (18)	6.3 (33)	1.82 (1.00 – 3.26)	7.7 (79)	6.6 (33)	8.8 (46)	1.37 (0.86 - 2.19)
United States	3.4 (62)	1.9 (17)	4.8 (45)	2.56 (1.46 – 4.53)	3.9 (70)	2.7 (24)	4.9 (46)	1.84 (1.11 – 3.05)
Israel	6.7 (67)	5.0 (24)	8.3 (43)	1.73 (1.03 – 2.90)	4.9 (49)	5.2 (25)	4.6 (24)	0.89 (0.50 – 1.58)
United Kingdom	5.3 (56)	3.0 (10)	6.4 (46)	2.20 (1.10 – 4.41)	12.9 (136)	13.0 (43)	12.9 (93)	1.00 (0.68 – 1.47)

Note: Statistically significant ($p < .05$) effects are in bold. OR = Odds ratios. 95% CI = 95% Confident intervals.

Table 3

Binary logistic regression analysis predicting likelihood of receiving PTSD and CPTSD diagnosis across age groups.

	PTSD % (n)	B	S.E.	OR (95% CI)	CPTSD % (n)	B	S.E.	OR (95% CI)
<i>Ireland</i>								
18-25	8.0 (10)	0.60	0.56	1.82 (0.60 – 5.52)	8.0 (10)	-.02	.47	.976 (0.38 – 2.50)
25-35	7.3 (15)	0.50	0.53	1.65 (0.58 – 5.66)	4.9 (10)	-.55	.47	.537 (0.23 – 1.45)
35-44	3.8 (9)	-0.20	0.57	0.82 (0.27 – 2.50)	7.9 (19)	-.03	.42	.965 (0.42 – 2.20)
44-54	4.1 (8)	-0.10	0.53	0.90 (0.29 – 2.82)	9.7 (19)	.19	.42	1.21 (0.52 – 2.82)
55-65	2.8 (4)	-0.51	0.68	0.60 (0.16 – 2.29)	8.3 (12)	.02	.46	.600 (0.15 – 2.29)
65+	4.5 (5)	-	-	-	8.2 (9)	-	-	-
<i>United States</i>								
18-25	4.9 (9)	1.1	.68	3.13 (0.82 – 11.92)	1.6 (3)	-.18	.80	.83 (0.17 – 3.93)
25-35	6.2 (23)	1.4	.62	4.19 (1.23 – 14.23)*	4.6 (17)	.92	.59	2.50 (0.78 -7.89)
35-44	2.9 (10)	0.6	.67	1.79 (0.48 – 6.67)	4.3 (15)	.85	.59	2.33 (0.72 – 7.47)
44-54	4.5 (15)	1.0	.64	2.91 (0.82 – 10.27)	6.2 (21)	1.2	.58	3.32 (1.06 – 10.35)*
55-65	0.5 (2)	-1.2	.95	0.28 (0.04 – 1.82)	2.5 (10)	.26	.62	1.30 (0.38 – 4.40)
65+	1.6 (3)	-	-	-	2.2 (4)	-	-	-

<i>Israel</i>								
18-25	10.7 (17)	.87	.66	2.39 (0.67 – 8.87)	7.5 (12)	.91	.78	2.49 (0.54 – 11.45)
25-35	5.0 (13)	.05	.67	1.06 (0.29 – 3.83)	6.2 (16)	.70	.76	2.00 (0.45 - 8.97)
35-44	5.0 (10)	.06	.68	1.05 (0.28 – 3.97)	5.5 (11)	.57	.78	1.79 (0.38 – 8.28)
44-54	9.1 (15)	.70	.65	2.00 (0.56 – 7.16)	3.0 (5)	-.05	.85	.953 (0.18 – 5.04)
55-65	5.7 (9)	.20	.68	1.21 (0.31 – 4.62)	1.9 (3)	-.53	.93	.580 (0.09 – 3.62)
65+	4.8 (3)	-	-	-	3.2 (2)	-	-	-
<i>United Kingdom</i>								
18-25	5.6 (3)	1.4	.93	4.35 (0.70 – 26.7)	29.6 (16)	2.0	.47	7.47 (2.98 – 18.77)*
25-35	7.2 (16)	1.7	.76	5.77 (1.31 – 25.5)	17.6 (39)	1.3	.40	3.80 (1.72 – 8.40)*
35-44	7.3 (14)	1.8	.76	5.82 (1.30 – 26.0)	19.3 (37)	1.4	.41	4.23 (1.90 – 9.40)*
44-54	3.5 (8)	.99	.79	2.70 (0.56 – 12.9)	12.8 (29)	.95	.41	2.60 (1.15 – 5.85)*
55-65	6.3 (13)	1.6	.76	4.95 (1.10 – 22.3)	4.3 (7)	-.48	.53	.621 (0.22 – 1.75)
65+	1.3 (2)	-	-	-	5.3 (8)	-	-	-

Note: Statistically significant ($p < .05$) effects are in bold. B = unstandardized beta value; SE = standard error of beta; OR (95% CI) = Odds ratio with 95% confidence intervals.

Figure 1

Estimated prevalence rates of ICD-11 PTSD across age groups in each sample.

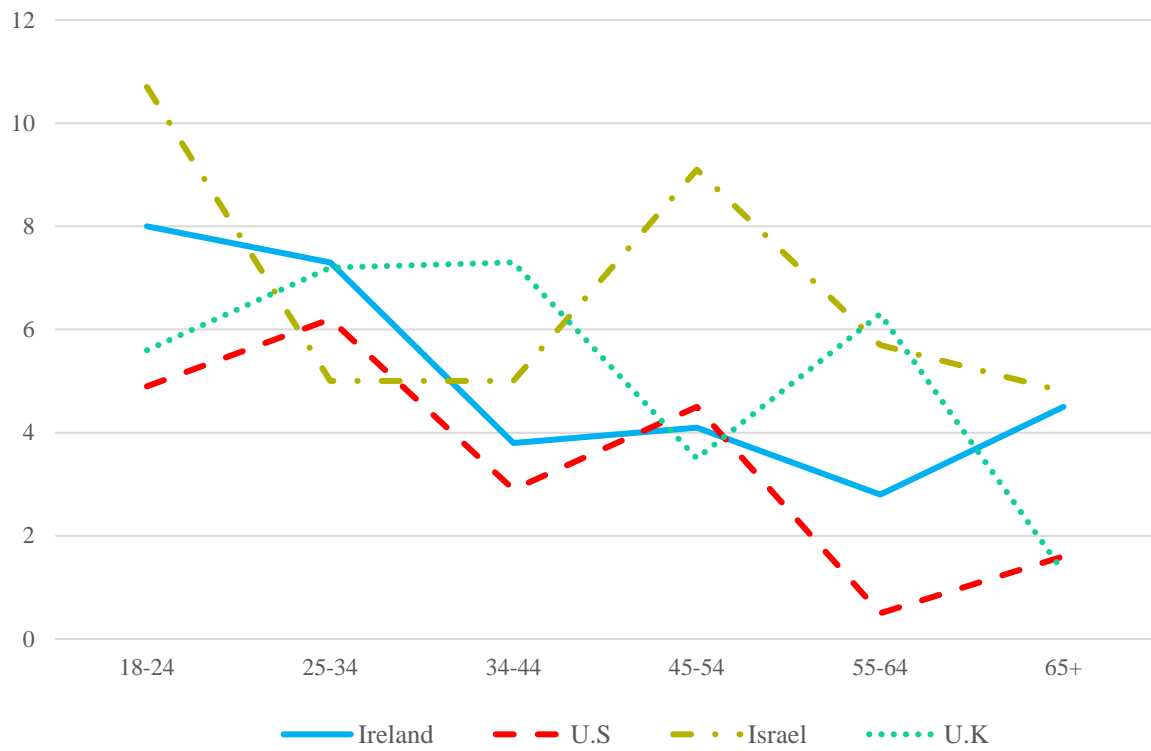
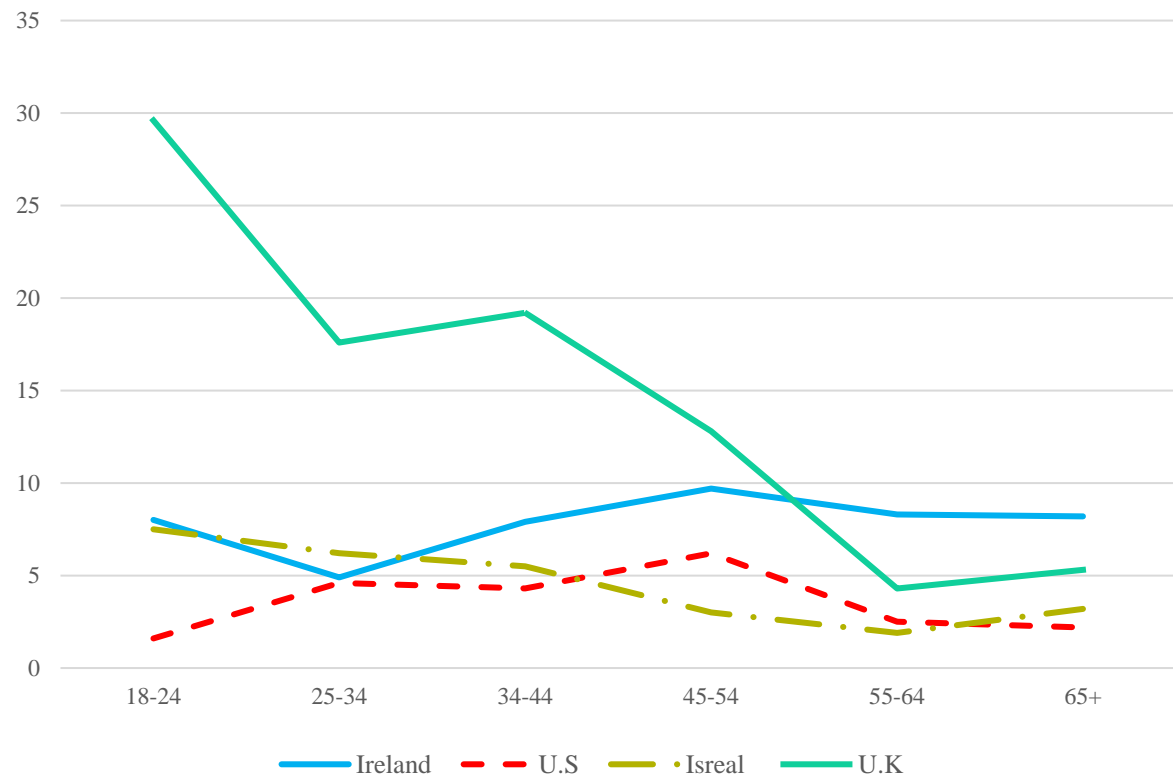


Figure 2

Estimated prevalence rates of ICD-11 CPTSD across age groups in each sample.



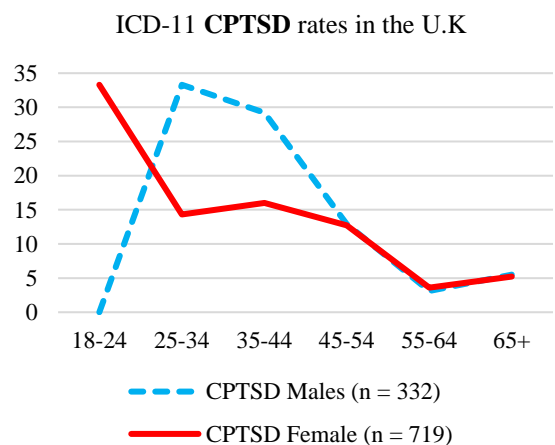
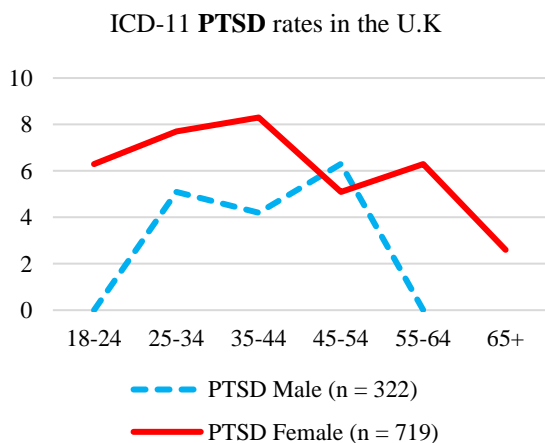
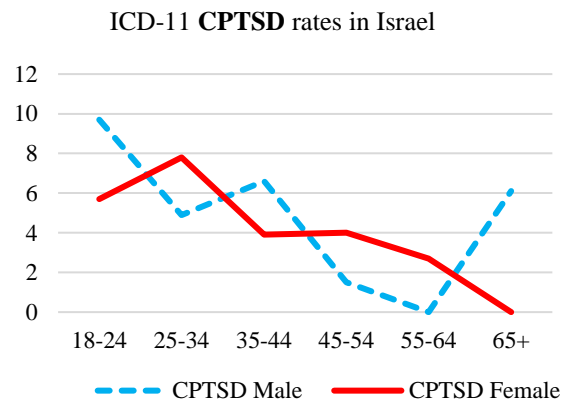
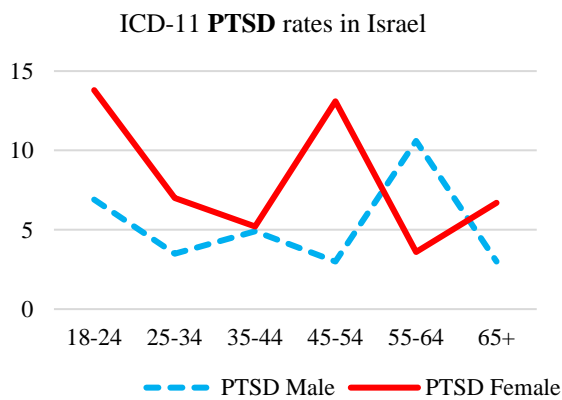
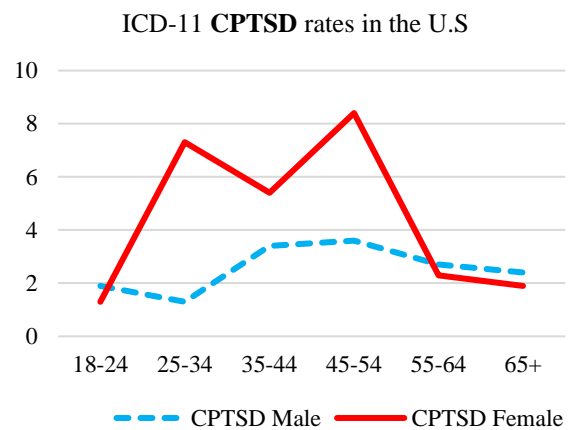
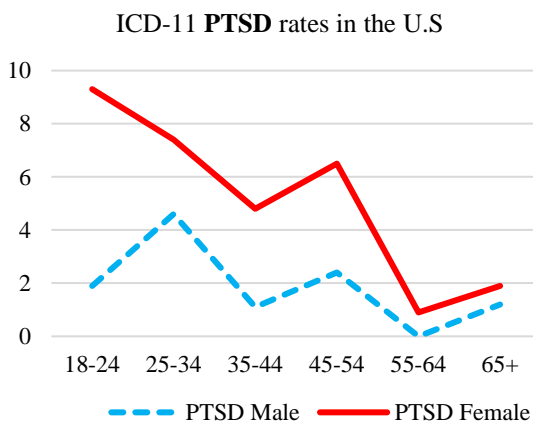
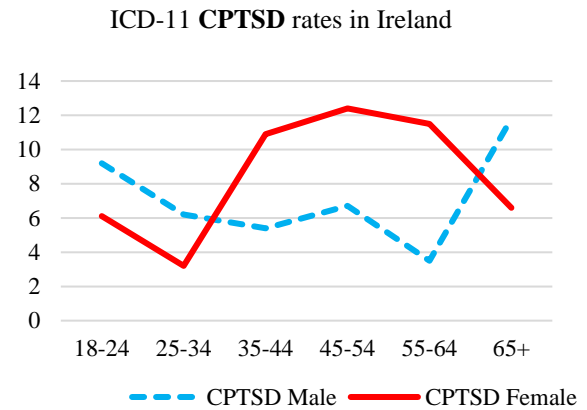
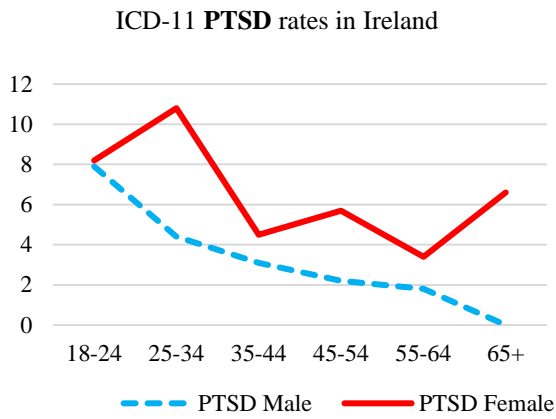


Figure 1. Sex differences in ICD-11 PTSD and CPTSD for Ireland, The U.S, Israel, and the U.K illustrated across age groups.