Three distinct patterns of mental health response after a sport accident

Manuscript

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2023-02-14

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# Abstract

# Keywords

sport accident, mental health, post-traumatic syndrome disorder, post-traumatic growth

# Introduction

# Methods

# Results

# Discussion

# Conclusion

# Acknowledgments

# Author’s contribution

# Conflict of interest

# Data and code availability

An R data (RDa) file with anonymized patient data will be made available upon request to the corresponding author. The study analysis pipeline is available at <https://github.com/PiotrTymoszuk/mental_accident>.

# Tables

Table 1: Demographic and socioeconomic characteristic of the study cohort. Numeric variables are presented as medians with interquartile ranges (IQR). Categorical variables are presented as percentages and counts within the complete observation set.

| **Variable** | **Statistic** |
| --- | --- |
| hospitalization – survey time, days | 1300 [IQR: 800 - 1400] range: 390 - 1600 n = 307 |
| sex | female: 45% (n = 137) male: 55% (n = 170) n = 307 |
| age, accident, years | 51 [IQR: 33 - 60] range: 18 - 82 n = 307 |
| residence in the Alps | 73% (n = 225) n = 307 |
| education | primary: 3.3% (n = 10) apprenticeship: 13% (n = 39) secondary: 38% (n = 115) tertiary: 45% (n = 136) n = 300 |
| employment | employed: 68% (n = 210) household: 3.3% (n = 10) unemployed: 0.33% (n = 1) student: 10% (n = 32) retired: 18% (n = 54) n = 307 |
| sport profession | 5.2% (n = 16) n = 307 |
| trauma-risk profession | 7.2% (n = 22) n = 307 |
| income/year | no income: 21% (n = 63) < 15000 Euro: 5.5% (n = 17) 15000 - 30000 Euro: 13% (n = 39) 30000 - 45000 Euro: 19% (n = 59) > 45000 Euro: 42% (n = 129) n = 307 |
| smoking | 7.8% (n = 24) n = 307 |
| drug consumption | 2.3% (n = 7) n = 307 |
| somatic comorbidity | 15% (n = 47) n = 307 |
| somatic comorbidity type | none: 85% (n = 260) CVD: 2.9% (n = 9) metabolic: 1.3% (n = 4) pulmonary: 0.65% (n = 2) neurological: 1.3% (n = 4) rheumatoid: 0.33% (n = 1) skin: 0.33% (n = 1) cancer: 0.65% (n = 2) other: 7.8% (n = 24) n = 307 |
| mental illness | 5.2% (n = 16) n = 307 |
| traumatic event before/DIA-X | 40% (n = 124) n = 307 |
| self-reported traumatic event type | none: 88% (n = 271) severe accident: 6.2% (n = 19) physical assult: 1.6% (n = 5) sexual molestation: 0.65% (n = 2) rape: 0.33% (n = 1) severe disease: 2% (n = 6) natural diseaster: 0.65% (n = 2) war: 0.33% (n = 1) n = 307 |
| self-reported traumatic event past | no trauma event: 88% (n = 271) 0 – 1 years ago: 0.33% (n = 1) 1 – 5 years ago: 3.9% (n = 12) 5 – 10 years ago: 1.3% (n = 4) 10+ years ago: 6.2% (n = 19) n = 307 |

Table 2: Characteristic of the sport accident, injury, psychological management and accident consequences. Numeric variables are presented as medians with interquartile ranges (IQR). Categorical variables are presented as percentages and counts within the complete observation set.

| **Variable** | **Statistic** |
| --- | --- |
| prior sport accidents | 38% (n = 118) n = 307 |
| sport typea | ski/snowboard: 64% (n = 197) sledding: 3.9% (n = 12) mountain: 14% (n = 42) biking: 16% (n = 48) other: 2.6% (n = 8) n = 307 |
| alone during the accident | 32% (n = 97) n = 307 |
| accident culprit | self: 77% (n = 237) tour partner: 1.3% (n = 4) third party: 8.1% (n = 25) blow of fate: 3.9% (n = 12) natural diseaster: 0.65% (n = 2) other reason: 8.8% (n = 27) n = 307 |
| injured persons | only self: 93% (n = 195) self and partner: 5.2% (n = 11) 3+ persons: 1.9% (n = 4) n = 210 |
| rescue | self: 50% (n = 155) tour partner: 13% (n = 39) rescue team: 29% (n = 89) third party: 7.8% (n = 24) n = 307 |
| rescue mode | no rescue team involved: 71% (n = 218) airborne: 13% (n = 40) on ground with stretcher: 5.2% (n = 16) on ground by foot: 2.3% (n = 7) other: 8.5% (n = 26) n = 307 |
| injury severity class, AIS scoreb | 1: 37% (n = 104) 2: 33% (n = 93) 3+: 29% (n = 82) n = 279 |
| head injury | 13% (n = 36) n = 279 |
| face injury | 12% (n = 33) n = 279 |
| neck injury | 1.1% (n = 3) n = 279 |
| chest injury | 11% (n = 32) n = 279 |
| abdomen injury | 3.2% (n = 9) n = 279 |
| spine region injury | 10% (n = 28) n = 279 |
| upper limb injury | 42% (n = 118) n = 279 |
| lower limb injury | 44% (n = 123) n = 279 |
| other injury | 12% (n = 34) n = 278 |
| psychological support | 5.2% (n = 16) n = 307 |
| psychological therapy post accident | 6.2% (n = 19) n = 307 |
| somatic accident aftermath | 37% (n = 115) n = 307 |
| returned to same sport | 85% (n = 262) n = 307 |
| behavior post accident | no change: 35% (n = 106) more cautious: 65% (n = 199) less cautious: 0.65% (n = 2) n = 307 |
| aski/snowdoard: alpine skiing, snowboarding and cross-country skiing sledding: sledding or bobsled mountain: hiking, climbing and skitouring biking: mountainbike, tour and road cycling | |
| bAIS: acute injury severity score | |

Table 3: Mental health characteristic of the study participants at survey completion. Numeric variables are presented as medians with interquartile ranges (IQR). Categorical variables are presented as percentages and counts within the complete observation set.

| **Variablea** | **Statistic** |
| --- | --- |
| PSS4 score | 4 [IQR: 3 - 6] range: 0 - 14 n = 307 |
| GAD-7 score | 1 [IQR: 0 - 3] range: 0 - 15 n = 307 |
| Anxiety+ (GAD-7 ≥10) | 2.3% (n = 7) n = 307 |
| PHQ-9 score | 2 [IQR: 1 - 5] range: 0 - 16 n = 307 |
| Depression+ (PHQ-9 ≥11) | 5.5% (n = 17) n = 307 |
| PHQ-15 score | 2 [IQR: 1 - 4] range: 0 - 23 n = 307 |
| Somatization+ (PHQ-15 ≥11) | 4.9% (n = 15) n = 307 |
| EUROHIS-QOL 8 score | 1.6 [IQR: 1.4 - 2] range: 1 - 4 n = 307 |
| EUROHIS-QOL 8 QoL score | 1 [IQR: 1 - 2] range: 1 - 3 n = 307 |
| EUROHIS-QOL 8 health score | 2 [IQR: 1 - 2] range: 1 - 5 n = 307 |
| EUROHIS-QOL 8 energy score | 2 [IQR: 1 - 2] range: 1 - 5 n = 307 |
| EUROHIS-QOL 8 finances score | 2 [IQR: 1 - 2] range: 1 - 5 n = 307 |
| EUROHIS-QOL 8 activity score | 2 [IQR: 1 - 2] range: 1 - 5 n = 307 |
| EUROHIS-QOL 8 self-esteem score | 2 [IQR: 1 - 2] range: 1 - 5 n = 307 |
| EUROHIS-QOL 8 relationship score | 2 [IQR: 1 - 2] range: 1 - 5 n = 307 |
| EUROHIS-QOL 8 housing score | 1 [IQR: 1 - 2] range: 1 - 5 n = 307 |
| SOC-9L score | 19 [IQR: 16 - 25] range: 10 - 49 n = 307 |
| RS13 score | 78 [IQR: 70 - 85] range: 15 - 91 n = 307 |
| RS13 coping class | low: 18% (n = 56) moderate: 14% (n = 42) high: 68% (n = 209) n = 307 |
| Abuse+ (CAGE ≥2) | 9.4% (n = 29) n = 307 |
| flashbacks during sport | 40% (n = 122) n = 307 |
| flashback frequency | no flashbacks: 60% (n = 185) > 1 – 2 per week: 2.6% (n = 8) several per month: 5.2% (n = 16) 1 – 2 per month: 9.8% (n = 30) 1 – 2 per year: 22% (n = 68) n = 307 |
| PCL-5 DSM-5 score | 3 [IQR: 1 - 7] range: 0 - 44 n = 307 |
| PCL-5 DSM-5 cluster B score | 0 [IQR: 0 - 2] range: 0 - 15 n = 307 |
| PTSD cluster B+ | 11% (n = 33) n = 307 |
| PCL-5 DSM-5 cluster C score | 0 [IQR: 0 - 1] range: 0 - 8 n = 307 |
| PTSD cluster C+ | 8.1% (n = 25) n = 307 |
| PCL-5 DSM-5 cluster D score | 1 [IQR: 0 - 2] range: 0 - 15 n = 307 |
| PTSD cluster D+ | 5.2% (n = 16) n = 307 |
| PCL-5 DSM-5 cluster E score | 1 [IQR: 0 - 2] range: 0 - 13 n = 307 |
| PTSD cluster E+ | 7.8% (n = 24) n = 307 |
| PTSD+ (at least one cluster) | 19% (n = 58) n = 307 |
| PTGI score | 32 [IQR: 16 - 48] range: 0 - 100 n = 307 |
| PTGI I relations score | 12 [IQR: 6 - 18] range: 0 - 35 n = 307 |
| PTGI II possibilities score | 5 [IQR: 1 - 9] range: 0 - 25 n = 307 |
| PTGI III personal strength score | 8 [IQR: 4 - 11] range: 0 - 20 n = 307 |
| PTGI IV spiritual score | 0 [IQR: 0 - 2] range: 0 - 10 n = 307 |
| PTGI V life appreciation score | 6 [IQR: 2 - 9] range: 0 - 15 n = 307 |
| aPSS4: 4-item perceived stress scale; GAD-7: 7-item general anxiety disorder scale; PHQ: patient health questionnaire; EUROHIS-QOL 8: 8-item EUROHIS project quality of life scale; SOC-9L: Leipzig 9-item sense of coherence questionnaire; RS13: 13-item resilience scale; CAGE: Cut/Annoyed/Guilty/Eye substance abuse scale; PCL-5 DSM-5: PTSD Checklist for DSM-5; PTGI: post-traumatic growth inventory | |

# Figures

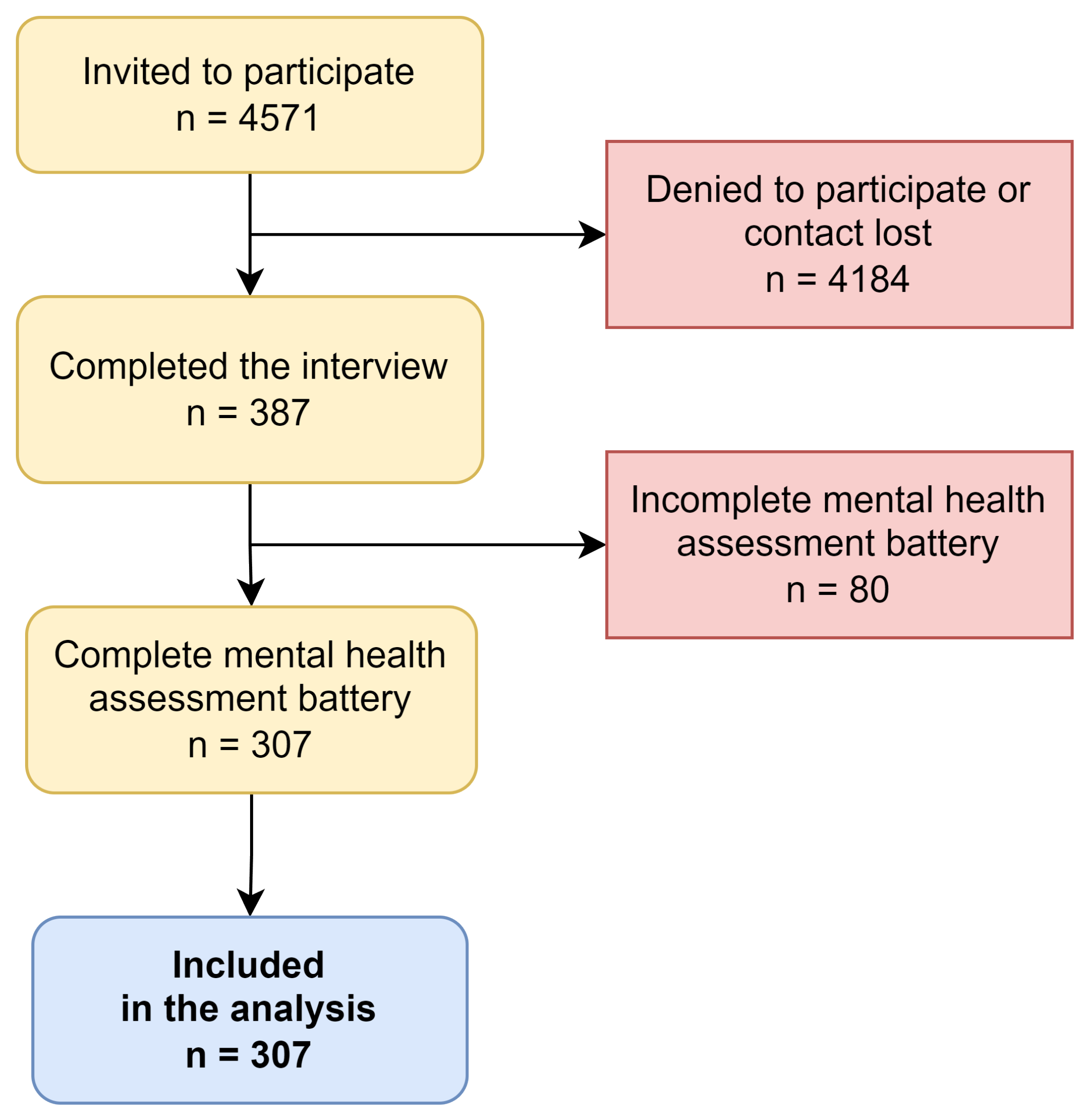


Figure 1: Flow diagram of the analysis inclusion process.

**Figure 1. Flow diagram of the analysis inclusion process.**

# References