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Article

Delayed-Onset Adjustment Disorder After Accident-Related Injuries: A Retrospective Analysis of Legal Cases

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Abstract

An adjustment disorder (AjD) is defined as a maladaptive response to an identifiable stressor, with symptoms expected to emerge within up to three months of that stressor. Recent evidence, however, indicates that AjD symptoms may appear long after the onset of that stressor, especially with chronic illness or ongoing stress. We conducted a retrospective exploratory analysis of 22 validity-checked forensic cases retained after the screening of 597 medical expert witness assessments (MEWAs). We examined onset latency relative to the index event and whether later or ongoing accident-related stressors were documented in proximity to AjD onset. In ~82% of cases, a clinically significant AjD developed after three months post-injury/illness, well beyond the acute aftermath of the incident. In approximately 55% of the cases, loss of recovery expectancy (LRE) was documented as a later-occurring accident- or illness-related stressor. Exploratory exact Wilcoxon–Mann–Whitney tests compared GPQ and SIMS scores between onset groups and GPQ scores between cases with and without LRE. The findings suggest that AjD symptoms may emerge long after the index event while still occurring in temporal proximity to later or ongoing accident-related stressors. These observations are preliminary and do not establish a definitive delayed-onset subtype or a causal trajectory.

Keywords: adjustment disorder; delayed-onset; medical expert witness assessments; forensics; work-related accident; work-related illness

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1. Introduction

Adjustment Disorders (AjDs) are common reactive mental disorders to stressors. An AjD is defined as a maladaptive reaction to an identifiable psychosocial stressor or multiple stressors. The ICD-11 (World Health Organization, 2024) names divorce, illness or disability, socio-economic problems, and conflicts at home or work as typical examples. AjDs are, as a reactive disorder, thus discussed in legal cases in which medical expert witness assessments (MEWAs) are conducted to provide information about the causal attribution of AjDs to a stressor such as an accident (Sonnenmoser, 2007; Widder, 2023), for example, in workers' compensation claims. Medical witnesses thereby rely on classifications of diseases as provided by the ICD-11 (World Health Organization, 2024) or the DSM-5 (American Psychiatric Association, 2013) to accurately assess and formulate diagnoses.

MEWAs also have the advantage of extensive data acquisition for every single case, the discussion of diagnoses according to diagnostic manuals, and usually include a validity assessment regarding the validity of response behavior. This makes data from MEWAs valuable regarding information on pathomechanisms of diseases.

Diagnostic systems have framed AjD as a mostly short-latency condition: the DSM-5 requires onset of symptoms within three months of the stressor, whereas the ICD-11 states that symptoms typically emerge within one month. The DSM-5 further describes an onset after the experience of an event at a level disproportionate to the severity or intensity of the stressor, while the ICD-11 describes an onset after experiencing one or multiple identifiable psychosocial stressors. Both systems also allow symptoms to persist while a stressor or its consequences continue (American Psychiatric Association, 2013; World Health Organization, 2024). A rigid application of the index event as the sole temporal anchor for the diagnostic onset criterion may create a potentially discriminatory boundary for patients with non-conventional disorder trajectories. This, in turn, can introduce the risk that patients with non-conventional disorder trajectories will be misdiagnosed as having a separate mental disorder unrelated to the accident or even as feigning. Consequently, these patients risk being excluded from legitimate workers' compensation recognition and health insurance coverage. The assumption of a brief consecutive course of events has led to the conventional view that an AjD occurs proximally to the inciting stressor and remits relatively quickly (O'Donnell et al., 2019). For the present study, it is therefore important to distinguish two temporal anchors: the index accident or illness and a potential later or ongoing accident-related stressor immediately preceding symptom onset. We use the term "delayed-onset" descriptively for onset occurring more than 90 days after the index event.

Further, diagnostic conventions adhere to the concept of remission if the stressor dissipates. Divorce, workplace conflict and other socioeconomic stressors tend to resolve, and AjDs remit accordingly, as per ICD-11, no more than six months after the stressor resolved (World Health Organization, 2024). However, chronic illness or disability do not always show a similar remission course. There may be cases in which chronic AjD can develop, or in which the disorder may escalate into a more serious disorder (Pacella et al., 2024). In fact, 16% of the patients in a sample of injury survivors still met the criteria for AjD 12 months after severe injuries (O'Donnell et al., 2016). Similarly, in a high-risk community sample, Kazlauskas et al. (2022) identified four distinct twelve-month symptom trajectories (high symptom/prolonged, recovery, onset, low symptom), with almost one-third (28.8%) of subjects showing persistently high symptoms. A longitudinal study during the COVID-19 pandemic demonstrated that AjD symptoms often persisted for an extended period of time or fluctuated over time. The study identified stable predictors such as gender, prior mental disorders, and health status for such trajectories (Lotzin et al., 2024).

Additionally, studies of chronic medical conditions indicate that clinically relevant psychological symptoms may emerge or intensify months or years after the initial diagnosis or treatment. Such developments appear to reflect a dynamic interplay between illness-related burden and available coping resources (Stein et al., 2008), hinting at cases in which AjD symptoms may arise after the conventional one- or three-month time-period when coping with ongoing stressors is disrupted by diminishing intra- or interpersonal resources. Similarly, treatment-associated factors may significantly contribute to the development or prevention of an AjD (Kazlauskas et al., 2023).

A higher prevalence of affective disorders in patients with diabetes or rheumatoid arthritis compared to a sample of general hospital admissions shows that a chronic disease trajectory may lead to intense emotional distress in which hope for recovery or well-being plays a crucial factor in coping with the disease (Turner & Kelly, 2000). Together, these findings imply the existence of an important subset of AjD cases which may show ongoing

symptoms beyond the acute phase or cases which develop AjDs months after the injury occurred, and hope for recovery may play a critical role in these trajectories; we operationalize this phenomenon as loss of recovery expectancy (LRE). Such delayed-onset AjD cases could very well be misclassified or wrongfully attributed to other factors by conventional diagnostic standards, leading to an unjust legal outcome for those affected. It is, however, important to note that in medico-legal settings, a long interval from the index event alone cannot establish causality; competing stressors and alternative psychiatric explanations must also be considered. Nevertheless, accident-related stressors may remain clinically relevant if they are temporally and substantively linked to symptom onset.

In this retrospective study, we provide data for 22 AjD cases systematically extracted from a large dataset of 597 real-life MEWAs. We propose two exploratory research questions: (1) how frequently was AjD onset estimated to occur more than 90 days after the index event, and (2) which later or ongoing accident-related stressors, particularly LRE, were documented as preceding symptom onset?

2. Materials and Methods

2.1. Data

The data were extracted from 597 MEWAs conducted from 19 December 2022 to 19 February 2025 at the Institute for Neurological-Psychiatric Assessments in Bamberg, Germany. This pool comprised 119 accident-insurance cases. The other part of the sample consisted of cases considering statutory pension insurance, MEWAs from private firms or state institutions, as well as other forensic referrals. The original pool thus consisted of a multitude of forensic contexts and case histories, not just accident insurance cases. In other words, about a fifth (19.93%) of the MEWAs in the pool were accident insurance cases in which AjDs can play an important role. Data collection was retrospective in nature and consisted of a text analysis of these assessments. These MEWAs were consecutive referrals and typically consisted of 40–50 pages. They contained a thorough case evaluation including trauma anamnesis, biographical anamnesis, neurological, physical and psychological evaluations as well as psychometric test reports and an evaluation of third-party reports. Further, each case was evaluated regarding invalid response behavior (Young et al., 2025b).

Of the 597 MEWAs, 60 in which an AjD was diagnosed were identified after an initial screening. In total 38 further MEWAs were excluded due to the reasons listed in Figure 1. 2 cases had to be excluded because they were based on third-party records only, 21 cases were excluded because the AjD diagnosis was made due to other reasons than an accident (e.g., due to the court proceedings). During revision, 4 more cases from the original 26-case analytic sample were excluded from the primary analysis because causal attribution of the AjD to the accident or illness was considered insufficiently clear. To examine whether this exclusion materially affected the findings, the primary exploratory analyses were repeated with all 26 cases as a sensitivity analysis and are reported in the Supplementary Material. Additionally, 5 cases had to be excluded due to insufficient information regarding the AjD onset or the date of the accident/illness in question. 6 cases showed signs of invalid response behavior and were also excluded, resulting in a final sample of 22 cases. Of the 22 included cases, 19 were accident-insurance cases, corresponding to approximately 16% of the 119 accident-insurance MEWAs in the original dataset. Due to response behavior being assessed in the final step of the selection process, an exact denominator restricted to accident-insurance cases with valid response behavior could not be calculated. The proportion of plausible cases for this calculation was extrapolated from a recent study investigating a German-speaking sample of MEWAs and a reported ~52% of plausible cases (Klett et al., 2026b). The estimation of a plausible accident insurance population was calculated as $119 \times 0.52 = 61.88$. Using the final number of accident insurance cases in this

study (19), the formula for calculating the percentage of final accident insurance cases from the pool of plausible accident insurance cases is as follows: $30.70\% = \frac{19}{119 \times 0.52}$.

Considering the number of cases involving psychological consequences from an accident, resulting not in an AjD but a post-traumatic stress disorder, as well as cases in which AjD was diagnosed alongside invalid response behavior, AjD cases become increasingly relevant in accident insurance contexts. The number of 31% of all plausible accident insurance cases should be interpreted as an approximation rather than an exact estimate.

Data extraction was conducted in 2025. All data used for analysis were anonymized, with particular care taken to remove potentially identifying information from quotations.

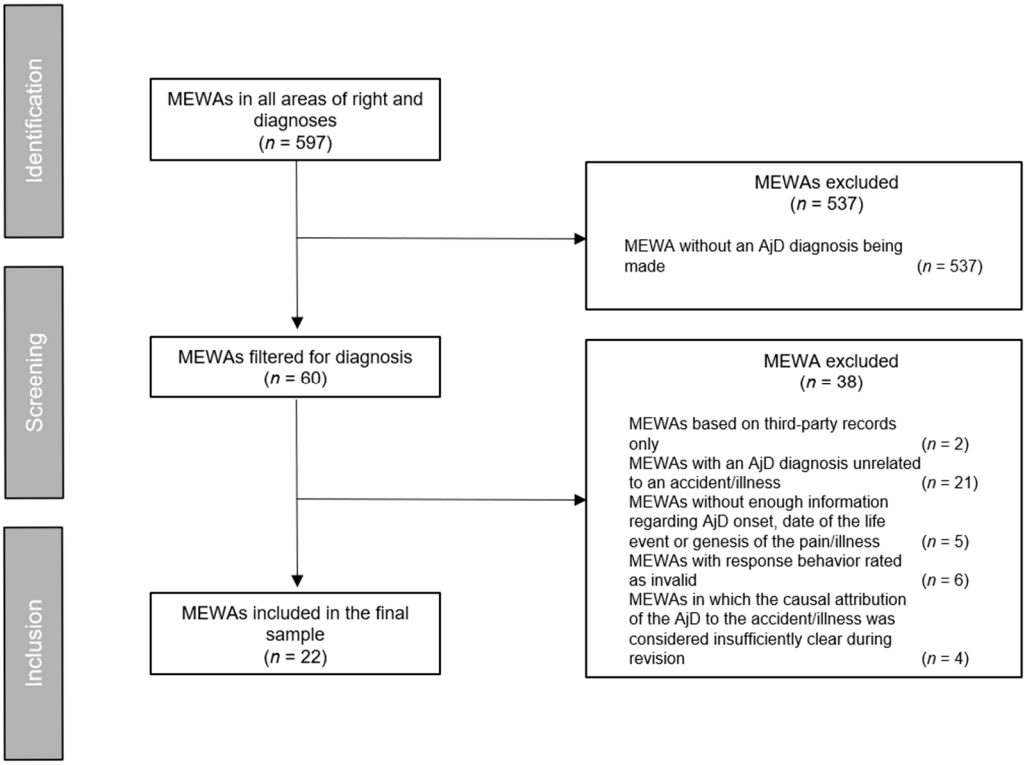


Figure 1. Flowchart of the Sample Selection.

2.2. Psychometric Tests

Structured Inventory of Malingered Symptomatology (SIMS) (Cima et al., 2003). The SIMS is a self-report measure designed to detect feigned symptoms and is commonly used to assess invalid response behavior in German MEWAs. The assessed individuals answer 75 statements with either 'yes' or 'no', and the number of responses indicative of feigning are summed up. A score above or equal to 17 is indicative of feigning response behavior according to the original validation. The test has an excellent test–retest reliability of $r = 0.97$ and a good internal consistency of $\alpha = 0.80$.

German Pain Questionnaire (GPQ/DSF) (Nagel et al., 2020). The GPQ is a basic tool for standardized pain documentation developed by the German Society for Pain Therapy (DGS) and the German Society for the Study of Pain (DGSS). The GPQ contains a body diagram for marking the location of pain and scales for recording pain intensity. The 11-point scale (0–10) regarding the average pain over the last four weeks was used as a measurement of pain. In case the subjects showed uncertainty in their response, for example, marking both 5 and 6 on the scale, the mean between those values was used for the analysis, in this example 5.5. The scale was used in this study to assess chronic pain following work-related injuries in correspondence to AjD symptoms.

2.3. Adjustment Disorder Diagnosis and Onset Latency

The diagnoses within the MEWAs, including AjD diagnosis, were made according to the criteria of the ICD-11 (World Health Organization, 2024) and were based on information collected by the medical expert during a full neurological and psychological assessment as well as self-report scales and psychometric tests, which were conducted by trained personnel with a background in psychology under supervision. The diagnoses within the MEWAs were usually made by one medical expert and are thus based on objective criteria of the ICD-11 as well as the subjective expert opinion.

AjD onset latency in days relative to the index event was calculated by subtracting the documented date of the index accident or work-related illness from the best-supported estimate of AjD symptom onset. Onset information was reconstructed from clinical narratives, claimant reports, medical-expert judgments, and third-party documentation.

This estimate of latency could, for example, be deduced from a direct statement of the assessed person, a medical expert or third-party records, stating, e.g., 'the person developed symptoms after being told by the physician that there will be no further improvement'. Further, some cases showed signs of symptom development directly after an operation or an inpatient stay in which case this information (e.g., onset after surgery intended to cure) was also regarded as substantial.

Cases were grouped descriptively into early onset ($\leq$90 days) and delayed onset (>90 days) relative to the index event. The 90-day threshold was selected because the DSM-5 allows a longer onset interval as compared with the ICD-11 and therefore provides the more conservative primary threshold for identifying cases in which the onset occurred clearly outside conventional short-latency expectations. An independent rater also coded the estimated onset. The second rater could not conclude one specific date for AjD onset in one subject. Thus, inter-rater reliability was calculated using the remaining 21 subjects. Inter-rater reliability of the estimated onset latency was excellent, ($ICC(A,1) = 0.997$, *95% CI* $[0.993, 0.999]$). Due to the ICC's reliance on the variance of the subjects and on onset latency ranging from 19 to 2976 days this result regarding relative differences between ratings must be interpreted with care, however. The median absolute difference between ratings was 5 days ($IQR = 13$), indicating close agreement for most cases despite larger discrepancies in two observations.

2.4. Loss of Recovery Expectancy (LRE)

The MEWAs were screened for evidence that LRE constituted a later accident-related stressor temporally linked to AjD symptoms. LRE was coded only when the narrative explicitly indicated a substantial reduction or LRE, for example after information that impairment was likely permanent, repeated unsuccessful treatment, or recognition that return to previous occupational or functional status was unlikely. Surgery, hospitalization, or treatment failure alone were not sufficient for LRE coding unless the documentation linked the event to a changed expectation of recovery. These events could be used as temporal anchors for symptom onset but not as evidence of LRE by themselves. This distinction was intended to separate LRE from general treatment-related stress. This screening included sentences like 'the psychological symptoms began after the second operation. He had hoped that things would improve. He had hoped that he would be able to return to work. However, he is no longer able to do so and has lost his job.' The reliability of the ratings of the 22 cases was verified by an additional independent rater, showing a good inter-rater reliability of κ 0.72. A detailed collection of these quotations as well as quotations regarding the sources of AjDs in cases which did not experience LRE can be found in Table S1 in the Supplementary Material.

2.5. Response Validity

Response behavior was assessed using a multimodal Criteria-Based Validity Assessment (CVA), which integrates clinical findings, third-party records, laboratory or examination findings, and psychometric validity indicators in accordance with multimethod principles (Chafetz, 2011; Chafetz et al., 2015; Young et al., 2025a). CVA is standard in assessing case validity and response behavior in German MEWAs (AWMF, 2019). Recent studies have examined the stability and validity of this approach in German medico-legal assessments (Klett et al., 2026a, 2026b). Using CVA, cases can thus be classified as either plausible or implausible regarding valid or invalid response behavior, respectively. Only cases classified as plausible/valid by the overall CVA evaluation were retained. This procedure reduces concern about invalid symptom reporting but does not, by itself, establish diagnostic causality or prove that the reconstructed accident-related pathway is correct.

Even though SIMS scores of ≥17 are conventionally used as a threshold indicative of feigning, evidence exists for a higher threshold of 24 in forensic assessments (van Impelen et al., 2014). Additionally, the use of multimodal validity criteria via CVA allows cases to have elevated symptom validity scores without flagging a case as implausible (Klett et al., 2026a, 2026b). Consequently, these cases may have been retained in the final sample if the case did not reach the CVA threshold of ≥4 conspicuous criteria.

2.6. Statistical Analysis

Data preprocessing, descriptive analyses, visualization, and exploratory statistical testing were conducted in R/RStudio Version 4.6.0 (RStudio Team, 2015). Because of the small and unbalanced groups, analyses were treated as exploratory rather than confirmatory. Continuous GPQ pain scores and SIMS scores were compared between early- and delayed-onset cases using exact Wilcoxon–Mann–Whitney tests. GPQ scores were also compared between cases with and without LRE. For these analyses, the Mann–Whitney U statistic, exact two-sided p-values, and rank-biserial effect sizes were reported. Missing GPQ values were not imputed. No multivariable causal model was fitted because the final sample and especially the early-onset subgroup were too small for reliable adjustment of multiple potential confounders.

3. Results

The final sample consisted of 22 medico-legal AjD cases. The sample comprised 5 women and 17 men with an age range between 25 and 63 ($M = 49.64$, $SD = 11.84$) who experienced accident-related physical injuries or work-related illnesses.

In 19 out of the 22 cases (86.36%), chronic pain was a substantial stressor. In 12 of 22 cases (54.55%), LRE was present. Other documented stressors are summarized in Figure 2; categories are non-mutually exclusive because individual cases could contain several simultaneous or sequential stressors.

SIMS scores ranged from 8 to 24 points ($M = 15.59$, $SD = 4.95$). GPQ average pain scores ranged from 2.5 to 8 points ($M = 5.90$, $SD = 1.42$), with 3 cases missing this value. These values were not imputed and, thus, excluded from the calculation of the mean. The onset latency ranged from 19 to 2976 days ($Mdn = 446.50$; $IQR = 289.75–720.25$).

Table 1 summarizes the revised sample by onset group using the conservative 90-day DSM-5 threshold. Only 4 out of the 22 (18.18%) cases showed an AjD onset latency less than or equal to 90 days, revealing that 18 cases (81.82%) developed an AjD after three months, with a median of 581 days ($IQR = 327–772$), ca. 19 months after the initial stressor in terms of an accident or work-related illness (Figure 3).

Table 1. Data of Validity Checked Accident or Work-Induced-Physical Illness Cases Divided in Regards to Onset Latency of Three Months.

	Early-Onset (≤90 Days) (*n* = 4)	**Delayed-Onset (>90 Days) (*n* = 18)**	**Total (*n* = 22)**
Age (Mean; SD)	49.25; 16.42	49.72; 11.21	49.64; 11.84
Gender	Women: 0 Men: 4	Women: 5 Men: 13	Women: 5 Men: 17
Loss of Recovery Expectancy (LRE) (AF and RF)	2 cases (50.00%)	10 cases (55.56%)	12 cases (54.55%)
Chronic Pain as a driving factor (AF and RF)	2 cases (50.00%)	17 cases (94.44%)	19 cases (86.36%)
Average Pain Intensity (GPQ, 0–10) (Mean; SD)	4.50; 1.80	6.16; 1.23	5.90; 1.42
Onset Latency in days (Median; IQR)	43; 37–48	581; 327–772	446.5; 289.75–720.25
SIMS scores (Mean; SD)	17.00; 5.35	15.28; 4.97	15.59; 4.95
Conspicuous CVA validity criteria (Mean; SD)	0.25; 0.50	0.67; 0.69	0.59; 0.67

Note. SD = standard deviation; AF = absolute frequency; RF = relative frequency; IQR = interquartile range; GPQ = German Pain Questionnaire; SIMS = Structured Inventory of Malingered Symptomatology. Percentages in the early-onset group are based on a very small number of cases and should be interpreted descriptively.

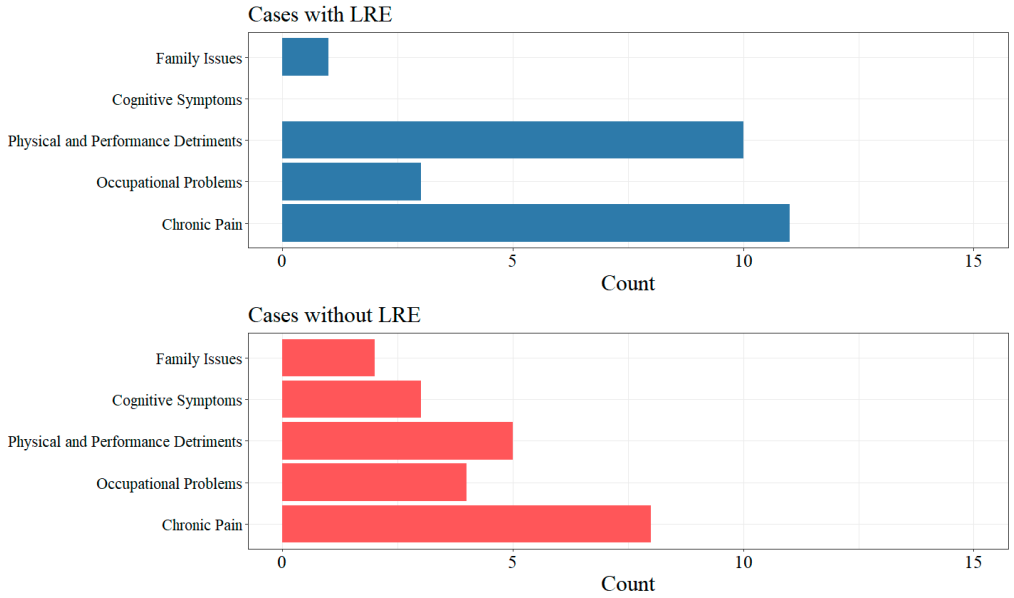


Figure 2. Stressors Related to Adjustment Disorders. *Note*. LRE = Loss of Recovery Expectancy. Bars represent counts of documented stressors and are not mutually exclusive; an individual case may contribute to more than one category.

In 10 (55.56%) delayed-onset cases, AjD LRE was described as a substantial accident- or illness-related stressor, while in the other 8 (44.44%) delayed-onset cases LRE was not apparent. In these LRE-independent cases, AjDs developed by other means. In 2 (50.00%) cases in the early-onset group, LRE was experienced within the first three months after the initial accident/illness. One case showed an exceptionally long estimated onset latency of

2976 days. This observation was retained because of the concise statement regarding the onset of psychiatric symptoms by the claimant and is displayed explicitly in Figure 3.

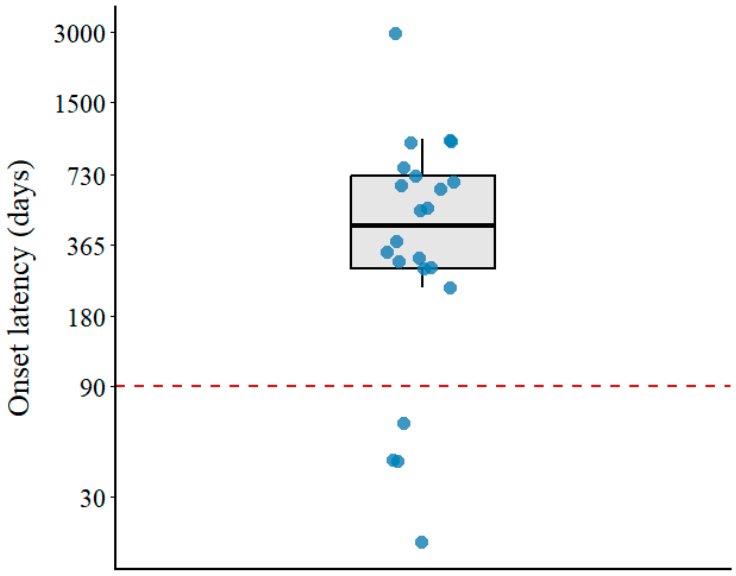


Figure 3. Distribution of AjD Onset Latency Relative to the Index Event. *Note.* Individual observations are displayed with the 90-day DSM-5 reference line in red. To increase visibility of the individual datapoints a logarithmic y-axis was applied.

86.36% of cases were dealing with chronic pain. This number went down to 50.00% in the early-onset group (2 cases), while 94.44% of delayed-onset AjD cases were dealing with chronic pain. Further, the delayed-onset group scored 1.66 points higher in mean pain scores than the early-onset group.

Exploratory non-parametric analyses (Table 2) indicated a tendency toward higher pain intensity in delayed-onset compared with early-onset cases, although this difference did not reach statistical significance ($U = 9.00$, *exact* $p = 0.080$, $r_{rb} = -0.63$, $PS = 0.188$). The probability-of-superiority estimate showed that an early-onset case had a higher pain score than a delayed-onset case in only 18.80% of pairwise comparisons, corresponding to an estimated 81.30% probability that a delayed-onset case had the higher pain score. SIMS scores showed no meaningful difference between onset groups ($U = 43.50$, *exact* $p = 0.549$, $r_{rb} = 0.21$, $PS = 0.604$) and the probability that an early-onset case had a higher SIMS score than a delayed-onset case was 60.40%, indicating only a small group difference. Additionally, the mean scores in early- and delayed-onset cases were below or near the recommended cut-off (Cima et al., 2003) as expected in application of CVA.

Table 2. Exact Wilcoxon–Mann–Whitney Comparison of GPQ Scores Between Early and Delayed Onset, LRE and no LRE, as well as SIMS Scores Between Early and Delayed Onset.

Comparison	n (First)	n (Second)	U	Exact *p*-Value	Rank Biserial r	Probability of Superiority
GPQ score: early vs. delayed onset	3	16	9.00	0.080	−0.63	0.188
SIMS score: early vs. delayed onset	4	18	43.50	0.549	0.21	0.604
GPQ score: no LRE vs. LRE	8	11	42.00	0.889	−0.05	0.477

Note. GPQ = German Pain Questionnaire; SIMS = Structured Inventory of Malingered Symptomatology. LRE = Loss of Recovery Expectancy.

Pain intensity was also highly similar between cases with and without LRE ($U = 42.00$, *exact* $p = 0.889$, $r_{rb} = -0.05$, PS = 0.477). The probability that a case without LRE had a higher pain score than a case with LRE was 47.70%, which is very close to chance. These

findings provide no evidence that LRE was associated with greater pain severity, while the comparatively large effect observed for pain intensity across onset groups warrants further investigation in larger samples. A cross-tabulation table (Table 3) shows the relation of median GPQ scores across onset groups and LRE status.

Table 3. Cross-Tabulation Table of median GPQ Scores across Onset and LRE Group.

Onset Group	No LRE	LRE	Total
Early Onset (≤90 days) (n)	5.00 (1)	4.20 (2)	5.00 (3)
Delayed Onset (>90 days) (n)	6.00 (7)	6.00 (9)	6.00 (16)
Total	6.00 (8)	6.00 (11)	6.00 (19)

Note. GPQ = German Pain Questionnaire. Due to the small number of early onset cases these results must be interpreted with care and offer opportunity for further analysis.

The mean number of conspicuous CVA criteria in delayed- and early-onset cases were far below the recommended cut-off of ≥4 conspicuous criteria (Klett et al., 2026a, 2026b) showing cases with sufficient plausibility and consistency of reported symptoms.

Exploratory descriptive and non-parametric analyses regarding the original sample of 26 cases before revision can be found in the Supplementary Material. The results are comparable to those of the final 22 cases analyzed. Factors related to personality disorders can also be found in the Supplementary Material but due to the small sample could not be examined inferentially.

4. Discussion

This exploratory study identified cases in which AjD symptoms emerged well beyond the conventional short interval after an accident or work-related illness. Although this study was limited by its small sample size, especially in the early onset group, the majority of cases in this sample had an AjD onset more than 90 days after the index event. In cases with later accident-related stressors, symptom onset may represent a timely reaction to a new or persisting stressor within the broader consequences of the original event.

Our second exploratory question concerned whether LRE was documented as a later accident-related stressor in temporal proximity to AjD onset. LRE was documented as a relevant secondary stressor in a substantial number of cases. Due to the reliance of non-parametric and missing multivariance analysis, the independent effect of confounding stressor, such as chronic pain, could not be estimated. This study should therefore be considered as preliminary support for LRE as one possible later stressor rather than confirmation of a primary causal mechanism. In several cases, the assessment described an initial period of coping followed by psychological deterioration when recovery expectations declined after unsuccessful treatment, persistent functional limitations, or information suggesting lasting impairment. Other cases developed AjD symptoms without documented LRE, indicating that multiple accident-related stressors may contribute to later psychological adjustment difficulties. Accordingly, the present data do not support the claim that LRE is the primary explanatory factor over chronic pain, persistent disability, treatment failure, occupational consequences, or accumulating social stress. LRE should instead be understood as one possible accident-related stressor that may occur later within a broader framework of potentially relevant factors.

These findings should be interpreted cautiously, due to the small sample size of only 4 early onset cases. Additional research is needed with larger sample sizes and adequate multivariate analysis to evaluate whether these patterns replicate in larger samples. The 2976-day observation illustrates the considerable heterogeneity of onset latencies and should

not be interpreted as representative of the typical delayed-onset case; accordingly, onset latency was reported primarily using the median and IQR.

The pattern aligns with clinical observations in other medical conditions: when an illness becomes refractory or recurrent, patients often experience a spike in distress. 35% of patients facing a first recurrence of breast cancer developed an AjD, a rate much higher than in those with initial diagnosis (O'Donnell et al., 2019). Despite the blind spot regarding delayed-onset AjD diagnosis, due to the nature of the diagnostic criteria, there are findings about an increase in post-traumatic stress symptoms following a secondary stressor in parents of children experiencing a relapse or a second major cancer-related stressor (Jurbergs et al., 2009). This shows that a renewed or worsening threat—here, the return of cancer—or collapse of hope can provoke maladaptive responses even after a period of relative psychological stability in which coping had been possible.

Likewise, in chronic pain populations, researchers have argued that persistent pain with poor treatment response frequently leads to psychological disturbance best captured as an AjD (Katz et al., 2015). Subjects with amputation are also at risk for symptoms of affective and anxiety disorders months after the procedure (Jo et al., 2021). Indeed, prolonged pain and disability are well known to erode resilience over time; inadequate pain control and extended suffering substantially increase the risk of depression and anxiety (Zeng et al., 2025). The present observations are compatible with a model in which accumulating illness burden or a change in appraisal challenges previously sufficient coping strategies. This interpretation is especially relevant when a later event, such as confirmation of permanent impairment or repeated treatment failure, changes the meaning of the original injury for the affected person.

A substantial proportion of delayed-onset cases did not show documented LRE and instead involved ongoing occupational, functional, pain-related, or social stressors. One possible explanation is a gradual reduction in coping resources over time; however, resilience or resource depletion was not measured directly in this study. It should therefore be treated as a hypothesis for future prospective research. Prospective designs that repeatedly assess stressor appraisal, coping resources, treatment course, and symptom onset would be required to test this explanation. It is also possible that the MEWAs in these cases did not manage to capture LRE as a source for AjDs, highlighting the need for a more detailed assessment of each case.

The broader literature supports viewing AjD symptoms as potentially dynamic rather than as a single uniform trajectory. Stein et al. (2008) proposed an integrative model predicting psychological long-term effects of cancer as an interplay between personal resources and stress/burden of the illness/treatment. Importantly, there is a dynamic balance in which resources and stressors fluctuate over time. This conceptualization is supported by other research showing that long-term survivors of cancer are significantly at risk for serious psychological distress even twelve years after the initial diagnosis (Hoffman et al., 2009). Additionally, different trajectories of AjD symptoms are recognized and can lead to an AjD long after treatment (Wijnhoven et al., 2022). Even though this model was proposed specifically for cancer, it can be applied to severe illness or loss of function following an accident as presented in this study. The present findings support considering changes in stress exposure and appraisal over time. A notable example of this phenomenon is also seen in myocardial infarction survivors who are at risk of experiencing an increase in emotional distress following discharge from hospital (Havik & Maeland, 1990). The loss of medical and psychological resources may lead to an imbalance between resources and stress.

The present findings, however, do not resolve whether the present cases reflect delayed response to the index event, response to a later related stressor, or a combination of ongoing

stressors. Considering the resilience erosion hypothesis, a combination of ongoing or novel accident-/illness-related stressors can play a major role in AjD development and need to be considered.

Chronic pain was common in the sample and may be clinically relevant to later AjD symptoms, but the present data cannot determine whether chronic pain independently contributes to delayed onset. The exploratory group comparisons quantify the observed pattern but cannot adequately control for duration since injury, injury severity, disability, treatment failure, or other correlated factors. In particular, pain chronification is itself time-dependent, making duration since the incident an important potential confounder. The findings therefore support careful assessment of persistent pain in medico-legal assessments and the time-dependent process of pain chronification may partly account for the observed difference between early- and delayed-onset cases (Stretanski et al., 2025). Further, several studies show that the prevalence of psychiatric co-morbidities in terms of depressive or anxiety symptoms in inpatients with chronic pain is high (Fishbain et al., 1998; Shoaib et al., 2013). These results highlight the importance of chronic pain assessment in medical evaluations as possibly one major stressor of AjDs.

The clinically and medico-legally important distinction is not simply whether symptoms occurred many months after the incident, but which stressor was temporally related and thus possibly relevant when symptoms emerged. In the present context, a rigid or potentially discriminatory temporal boundary refers to the date of the original accident as the sole temporal anchor for the diagnostic onset criterion. By contrast, a stressor-specific or non-discriminatory approach does not imply extending the diagnostic onset window indefinitely. Rather, it requires determining whether a later accident-related stressor can be independently documented and, if so, it is relevant to evaluate symptom onset relative to that stressor. Potentially documentable milestones include formal communication that no further substantial medical improvement is expected, confirmation of permanent functional or occupational limitations, or treatment failure that substantially changes the patient's expectation of recovery. Importantly, such events should not automatically be equated with LRE; consistent with the present coding procedure, additional evidence is required that the event was accompanied by a substantial change in recovery expectancy. A rigid temporal anchor to the original accident may overlook a later accident-related stressor that falls within the diagnostic onset window. Conversely, a long interval alone must not be taken as evidence of accident-related causation; alternative psychiatric diagnoses, unrelated life stressors, pre-existing vulnerabilities, and invalid reporting must still be evaluated. Likewise, medico-legal attribution requires an integrated assessment of the complete temporal and clinical course.

Recognizing delayed-onset AjDs attributable to ongoing symptoms or disability stressors or LRE is important for organizing follow-up care after surgery or follow-up care in chronic pain cases. It is also important for evaluation of injury-related claims. An accident or serious illness sets in motion a chain of medical and social events, and it can be the failure of remedial efforts that may present a substantial stressor for the injured. In practice, this means that medical expert witnesses should carefully explore the timeline of psychosocial stressors following an injury. A gap of many months with relative psychological stability does not preclude an AjD if a later development (e.g., medical or subjective confirmation of chronic disability) or ongoing severe symptoms alter the patient's appraisal and coping. Several additional factors may plausibly influence both LRE and later AjD symptoms, including pre-existing psychiatric disorders, injury severity, degree of disability, repeated treatment failure, socioeconomic difficulties, occupational consequences, and personality-related coping styles. The present retrospective sample is too small to propose definitive causal relations. Future prospective studies should measure these factors repeatedly and

distinguish the timing of the incident, later stressors, changes in recovery expectancy, and symptom onset.

From a practical perspective, recovery after severe injury should not be assumed to follow a linear course. Later treatment failure, confirmation of permanent limitations, or loss of occupational prospects may represent clinically meaningful transition points at which renewed psychological assessment or reasonable workplace accommodations becomes appropriate. In medico-legal decision making, considering such secondary stressors can reduce the risk of applying an overly rigid temporal boundary that ignores the actual stressor immediately preceding symptom onset, while still requiring careful evaluation of competing explanations.

Feigning of symptoms for secondary gain is a prevalent problem in forensic assessments (Klett et al., 2026a, 2026b). In analyzing the present MEWAs, each case was validated with a standard validity assessment, so that the strength of the current study lies in the control of distortions from symptom feigning. Through the rigorous validity assessment procedures used in the MEWAs, the likelihood that the delayed-onset AjD diagnoses were primarily caused by invalid symptom reporting was reduced. In all 22 cases, symptom reporting was judged credible.

5. Limitations

This study has several substantial limitations. The final sample is small and derived from medico-legal referrals. The sample is therefore vulnerable to referral and selection bias toward persistent, severe, or compensation-relevant cases. The absence of a clinical comparison or control group further limits interpretation, and the very small early-onset subgroup yields imprecise statistical estimates even when non-parametric tests are used.

The retrospective estimation of symptom onset introduces recall and documentation bias, and the exact onset date cannot be observed directly. Although independent rating can infer reproducibility, it cannot eliminate uncertainty in the underlying narratives. LRE and onset timing were also derived from overlapping medico-legal records, creating potential interpretative circularity when the narrative itself links psychological deterioration to failed recovery.

Regarding the relevance of the data, the rate of plausible accident insurance cases was derived from a previous study rather than observed directly in the present sample, the resulting 31% estimate should thus be interpreted as an approximated contextual estimate instead of an observed prevalence.

Relevant competing factors - including pre-existing psychiatric disorders, injury severity, disability level, treatment history, socioeconomic stressors, personality factors, and duration since injury - could not be adequately controlled. Some stressors may also have gone undocumented because they were forgotten by the claimant, not considered relevant at the time of assessment, or not captured in the records.

6. Conclusions

The present work expands the understanding of AjDs in the context of physical trauma and its medico-legal assessment and suggests that accident-related AjD symptoms may emerge long after the index injury, particularly when later or ongoing accident-related stressors are present. The findings support distinguishing time since the incident from time since the stressor that immediately precedes symptom onset. Later or ongoing stressors may include LRE, or other effects of persistent pain, unsuccessful treatment, functional loss, occupational consequences, or information on permanent disability. The present data do not establish which of these factors is primary or independently associated with later AjD onset; LRE should therefore be considered one potentially relevant stressor alongside direct

effects of chronic pain, persistent disability, treatment failure, occupational consequences, and other accumulating stressors. Considering these stressors, the development of AjDs many months after an injury may be sufficiently explained while fulfilling the temporal boundaries of the ICD-11 or DSM-5 without the need to adapt the onset time-period. Clinically and medico-legally, this distinction argues against applying the date of the index event as the only temporal anchor while emphasizing the need to assess competing stressors and alternative diagnoses. A more flexible, stressor-specific temporal assessment may support fairer diagnostic and medico-legal reasoning and may identify points at which renewed psychological support or reasonable accommodation is warranted. Depending on the clinical and occupational context, reasonable accommodation at transition points such as maximum medical improvement (MMI) (Brooks, 2000) may include graded return-to-work programs, modification of occupational duties, flexible working arrangements, or renewed access to psychological treatment.

Failure to recognize later accident-related psychological deterioration may also delay access to psychological treatment or compensation-related support. The resulting occupational, financial, and social strain could add to the individual's existing stress in form of a vicious cycle and potentially contribute to further psychological deterioration effects.

Additionally, interventions supporting coping and recovery expectancy may be clinically relevant and warrant prospective evaluation. We also would like to stress that debilitating diagnoses must be communicated with care, and, accordingly, follow-up appointments should be made in situations that risk inducing LRE within a 90-day time-window for a timely intervention of potential maladaptive responses or insufficient coping by the patient.

These conclusions remain preliminary and require prospective confirmation in larger and more representative samples.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/bs16112099/s1. Table S1: Adjustment Disorder Stressors of all Cases; Table S2: Data of Validity Checked Accident or Work-Induced-Physical Illness Cases Divided in Regards to Onset Latency of Three Months in the Original Sample of 26 Cases; Figure S1: Stressors Related to Adjustment Disorders; Figure S2: Distribution of AjD Onset Latency Relative to the Index Event; Table S3: Exact Wilcoxon–Mann–Whitney Comparison of GPQ Scores Between Early and Delayed Onset, LRE and no LRE as well as SIMS Scores Between Early and Delayed Onset in the Original Final Sample of 26 AjD Cases; Table S4: Cross-Tabulation Table of median GPQ Scores across Onset and LRE Group in the Original Final Sample of 26 AjD Cases; Figure S3: Personality Factors Contributing to the Development of Adjustment Disorder in all Cases; Figure S4: Personality Factors Contributing to the Development of Adjustment Disorder in the Original Sampel of 26 AjD Cases Before Revision.

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Abbreviations

The following abbreviations are used in this manuscript:

AjD	Adjustment Disorder
MEWA	Medical Expert Witness Assessment
CVA	Criteria-Based Validity Assessment
LRE	Loss of Recovery Expectancy

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