The Active Recovery Triad monitor: evaluation of a model fidelity scale for recovery-oriented care in long-term mental health care settings

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Abstract

Objective: The Active Recovery Triad (ART) model is a recently developed care model for people who are admitted to an institutional setting for several years and receive 24-h mental health care and support. This study focuses on the ART monitor, a model fidelity scale that measures the degree of compliance with the ART model. Our aim is to evaluate the psychometric properties of the ART monitor and to further improve the instrument.

Methods: Fifteen teams at the start (n = 7, group 1) or in the process (6 months to three years) of implementing care according to the ART model (n = 8, group 2) were audited using the ART monitor. Auditors were trained care workers, peer workers, and family peer workers. Auditors and team members provided feedback on the instrument. The content validity, construct validity and inter-rater reliability of the ART monitor were investigated. Based on the outcomes of these psychometric properties, the ART monitor was finalized.

Results: Regarding content validity, auditors and teams indicated that they perceived the ART monitor to be a useful instrument. In terms of construct validity, a significant difference (t(13) = 2.53, \( p < 0.05 \)) was found between teams at the start of the implementation process (group 1, average score of 2.42 (SD = 0.44)) and teams with a longer duration of implementation (group 2, average score of 2.95 (SD = 0.37)). When allowing for a one-point difference in scores, 88% of the items had an inter-rater agreement over 65%. Items with a relatively low inter-rater reliability, in combination with feedback from auditors and teams regarding content validity, provided direction for further improvement and revision of the instrument.

Conclusions: We concluded that the revised ART monitor is feasible and useful in mental health care practice. However, further evaluation of its psychometric properties will be needed.

Keywords: ART model, Model fidelity scale, Long-term mental health care, Psychometric properties

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The Active Recovery Triad (ART) model was developed by multiple stakeholders in the field of long-term mental health care. The principles of the ART model were defined based on scientific evidence, the practical experience of the involved professionals, and the experiences of (ex) service users, family and significant others. Because of this collaborative process, the ART model quickly gained a great deal of attention throughout the country.

In order to assess to what extent the ART model is implemented as intended within teams, also referred to as implementation fidelity, the content of the ART model was operationalized into a model fidelity scale: the ART monitor. Model fidelity scales are common instruments for quality improvement in practice and for research purposes. The literature shows that working with a model fidelity scale is beneficial for examining and, where necessary, improving the quality of the instrument, its usefulness as a guiding set of standards for recovery-oriented care can be fostered. Also, insight into its psychometric properties is needed for research purposes, as the ART monitor can be used in follow-up studies, for example to investigate the relationship between ART model compliance and intended outcomes, such as quality of care or service user recovery outcomes.

**Methods**

**Instrument**

The first version of the ART monitor consisted of 51 items, divided into nine domains. The structure of the ART monitor was as follows, listed by domain of the instrument:

1. **Team structure** included items regarding the team composition in terms of disciplines.
2. **Team process** addressed items related to the competencies of care workers, e.g., attitude and how they collaborate.
3. **Recovery-oriented care and support** included items based on the seven steps of the ART model for structuring care and support and working on recovery (the seven steps are explained in Additional File 1 and Zomer et al. [10]).
4. **Other principles of recovery-oriented care and support** comprised items regarding the professional aspects of the long-term care setting, including knowledge of professional guidelines, diagnoses and medication.
5. **Organization of care** included important conditions for the care process, e.g., admission and discharge, waiting list and consultation.
6. **Professionalization** focused on items regarding training, education and reflection of team members.
7. **Healing environment** addressed important conditions regarding the housing of service users.
8. **Safety** captured items related to expertise on and dealing with safety and safety management.
• 9) Reduction of coercion focused on the evaluation of coercive measures.

The development process of the ART model and the ART monitor has been described in Additional File 1. Table 1 shows three examples of items in the ART monitor. Some of these items focused on structural components of the model, including items regarding the professional disciplines in a team, such as “Peer worker and family peer worker”. In addition, effort has been made to incorporate items that are process oriented, for example, “Cooperation in the triad” and “Team spirit”. Scoring of the ART monitor was performed through an audit. The items were scored on a five-point scale, with response options ranging from 1 (not compliant) to 5 (fully compliant). However, for some items, fewer response options were available, depending on the content of the items or the number of criteria. An example is the item “Cooperation in the triad”, as depicted in Table 1. For this item and fifteen others, only scores 1, 3, and 5 were available; for one item, scores 1, 2, 4, and 5 were available.

Participants
Twenty Dutch mental health care organizations agreed to participate in the research project. Five organizations were in the orientation phase and did not actively want to start the implementation process of the ART model. Therefore, they were not ready to participate in the data collection, but they committed themselves to the ART model and provided financial support to complete this study. The other fifteen organizations actively participated in the data collection. Participation entailed the selection of one team to be audited and a feedback meeting using the ART monitor. Additionally, in every organization, a central contact person was appointed for communication related to and the organization of the data collection on location, and two or three persons were selected to become auditors.

A convenience sampling method was used, in which all fifteen organizations chose one team to participate in this study [24]. The selection of teams was performed by the central contact person of each organization, in agreement with the management and the team members concerned. There were only two important inclusion criteria, namely teams had to provide long-term psychiatric care for people with serious mental illnesses and either were at the start or in the process of implementing care according to the ART model. As a result, the degree of compliance with the ART model varied among the included teams. Two groups were identified. The first group consisted of seven organizations that chose to select a team at the start of the implementation process, allowing to use the results of the ART monitor as a baseline measurement to actively start the implementation process (group 1). These teams were already familiar with the ART model, but they had not structurally started to work according to this model. The other eight organizations chose to select a team that was further along in the implementation process, allowing to use the ART monitor results to provide insights to set new goals for future implementation (group 2). All teams followed their own course of implementation, which allowed each of them to prioritize certain elements of the ART model initially. Implementation was fostered by suggestions from the ART handbook, the ART monitor, national conferences, platform meetings and other small symposia regarding ART to stimulate knowledge sharing and experiences among teams and organizations [9]. Of the fifteen teams that participated in this study, eight were situated at open long-stay wards, two at partially open/partially closed long-stay wards, one at a closed long-stay ward and four at housing facilities situated at an institution.

Auditing process
Selection of auditors
The selection of auditors, who visited another organization to perform an audit using the ART monitor, was assigned to the central contact person of every participating organization. Inclusion criteria for the auditors were as follows: 1) basic knowledge of the ART model, 2) support for this vision and 3) be prepared to review an organization other than their own. People who volunteered to become auditors often did so because they were eager to learn from other organizations. Frequently, they already played an important role in the implementation of the ART model within their own organization or team, for example, working as a project leader, on a team implementing the model, or in a consulting role from the perspective of peer worker or family peer worker. The central contact person was instructed to assess the ability of the persons to perform audits, in consultation with the researchers (LZ and YV). They were explicitly asked to make an effort to recruit auditors not only from among mental health professionals but also peer workers and/or family peer workers.

All involved organizations, except two, provided auditors. In total, these audits were performed by 26 auditors: three peer workers, four family peer workers, five nurses, four social workers, four nurse practitioners, three managers, one psychiatrist, and two mental health specialists not otherwise specified. The auditors varied in years of work experience in care practice. Three auditors already had experience conducting audits for the HIC study [25].

Training of auditors
All 26 auditors participated in a one-day training program. This training was led by the main researcher
### Table 1 Examples of items in the ART monitor

| Item                                      | Score 1                                      | Score 2                                      | Score 3                                      | Score 4                                      | Score 5                                      |
|-------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| Peer workers and family peer workers     | There are 0.49 or fewer FTE (family) peer workers available | There are from 0.5 to 0.99 FTE (family) peer workers available | There are from 1 to 1.49 FTE (family) peer workers available | There are from 1.5 to 1.99 FTE (family) peer workers available | There are 2 or more FTE (family) peer workers available |
| Community participation                   | The team meets none of the criteria          | The team meets one criterion                 | The team meets two or three criteria          | The team meets four or five criteria          | The team meets all six criteria               |
| All service users are being supported with a form of community participation | • All service users are being supported with a form of community participation | • Occupational therapists and the rest of the team work towards increasing the community participation | • The team has contact with municipalities on a regular basis regarding community participation | • Rehabilitation interventions and individual placement and support (IPS) are used to stimulate community participation | • The team meets all three criteria |
| Occupational therapists and the rest of the team work towards increasing the community participation | • Recovery colleges are being introduced to service users | • The team acquires and maintains contact with organizations in the community | • The team has contact with municipalities on a regular basis regarding community participation | • Rehabilitation interventions and individual placement and support (IPS) are used to stimulate community participation | • The team meets all three criteria |
| Cooperation in the triad                 | The team meets none of the criteria          | -                                            | Aspects of the three criteria are recognizable. However, there is no consistency regarding the cooperation in the triad | -                                            | The team meets all three criteria |
| At the individual level, there is cooperation between service users, their significant others, and care workers | • At the individual level, there is cooperation between service users, their significant others, and care workers | • At the team level, service users and significant others are involved in change processes and their feedback is requested on a regular basis | • At the organizational level, service users and significant others are involved in policy making | • At the organizational level, service users and significant others are involved in policy making | • At the organizational level, service users and significant others are involved in policy making |
The analysis of this study focused on the evaluation of the psychometric properties of the ART monitor. Based on the outcomes of this evaluation, the ART monitor was finalized.

Investigating the psychometric properties

In order to evaluate the psychometric properties of the ART monitor, content validity, construct validity, and inter-rater reliability were investigated. Particularly in this early stage of working with this new instrument, these psychometric properties provided fruitful input for further improvement of the ART monitor [13, 22]. We were specifically interested in scores on individual items, as teams take individual items into account when improving their care and support. Since the goal of our study was not to reduce the items or present sub scores for domains, but rather allow the ART monitor to serve as a checklist to improve the quality of care, factor analysis and internal consistency were not considered.

Content validity

The evaluation of content validity consisted of two steps. First, qualitative feedback was gathered. The relevance, comprehensiveness and comprehensibility were examined from the perspective of the assessors (auditors) and the teams that use the ART monitor in practice as a tool to implement the ART model [22, 26]. The feedback was gathered at three moments: 1) from auditors after every audit, 2) during the follow-up meetings with auditors and 3) during feedback meetings with the teams. Emphasis was placed on the relevance of the items, scoring options, comprehensiveness of the instrument, topics that were missed, and comprehensibility and clarity of the concepts in the ART monitor. The feedback was sorted and analyzed for each item. The second step was to compare the average scores and standard deviation (SD) of individual items [20]. Structurally low or high scores for specific items might imply that they are not distinctive enough, that they might contain elements that are either too easy or too difficult to implement, or that some elements are
already common in mental health practice while others are more novel. These qualitative and quantitative data provided input about if and where to make changes to finalize the ART monitor.

**Construct validity**

To investigate construct validity, also referred to as discriminative validity or known group validity, it was examined whether the outcomes of the measurements were consistent with the hypothesis that a longer implementation process leads to higher scores on the ART monitor [12, 19, 22]. Mokkink et al. [22] referred to this type of construct validity as "hypothesis testing". Although there are similarities between, for example, the QuIRC or ROPI and the ART monitor, the ART monitor is more comprehensive, which limits the comparability of the monitor to these other measures. Our hypothesis was that teams that have been in the process of implementing care according to the ART model longer are likely to achieve higher scores on the ART monitor compared to teams at the start of the implementation process. To test this hypothesis, the variability between teams related to their stage of implementation was used and the audit scores of group 1 were compared with the audit scores of group 2. For group 1 (n = 7), the audit was the starting point for their implementation process. For group 2 (n = 8), implementation of the ART model was fostered by a longer involvement with national ART conferences, platform meetings and other symposia, internal working groups, and a longer time to familiarize themselves with the ART model by means of the ART handbook and the ART monitor. For each team, the average score on the ART monitor was calculated by the sum of all scores, divided by the total number of items. Since all items include a scoring range from 1 to 5, the differences in scoring options had no effect on calculating the average scores. In fact, an average reflects a score that is simple to interpret for care workers and it allows us to compare scores. In fact, an average reflects a score that is simple to interpret for care workers and it allows us to compare scores. Scoring of • items of the ART monitor were in need of improvement based on the outcomes of content validity and inter-rater reliability analyses, it was determined whether items of the ART monitor were in need of improvement in order to finalize the ART monitor. An overview was created of the following: 1) items with low inter-rater reliability (< 65% agreement); 2) items that received a lot of feedback regarding their relevance, comprehensiveness, and comprehensibility; and 3) items that scored structurally low or high. Items that met one or more of these criteria were critically reviewed by the researchers. When necessary, the feedback from auditors and teams regarding the relevance, comprehensiveness and comprehensibility provided direction on how to improve the items.

**Finalizing the ART monitor**

Based on the outcomes of the content validity and inter-rater reliability analyses, it was determined whether items of the ART monitor were in need of improvement in order to finalize the ART monitor. An overview was created of the following: 1) items with low inter-rater reliability (< 65% agreement); 2) items that received a lot of feedback regarding their relevance, comprehensiveness, and comprehensibility; and 3) items that scored structurally low or high. Items that met one or more of these criteria were critically reviewed by the researchers. When necessary, the feedback from auditors and teams regarding the relevance, comprehensiveness and comprehensibility provided direction on how to improve the items.

**Results**

The aim of this study was to evaluate the psychometric properties of the ART monitor and further develop the instrument. This was done in close collaboration with teams from different mental health care organizations in the Netherlands, by means of fifteen audits and feedback meetings. First, the findings of the evaluation
of the psychometric properties, including the content validity, construct validity, and inter-rater reliability, are presented. Then, the improvements made to the ART monitor, based on the outcomes of the evaluation, are described.

**Investigating the psychometric properties**

**Content validity**

Regarding the content validity, auditors and teams indicated that they perceived the ART monitor as a useful instrument, but their feedback included several suggestions for improvement related to the relevance, comprehensiveness and comprehensibility of the ART monitor. First, the items with only scoring options 1, 3, or 5 seemed to lack distinctive capability. Second, some items were similar in terms of their content. Third, some principles of the ART model were not well represented in the model fidelity scale. Fourth, some items were perceived as (partially) unclear. Fifth, some items did not fit into all settings where the ART model is being implemented (e.g., different standards are needed for (closed) clinical wards versus housing facilities). Sixth, some domain titles were unclear (e.g., the domain “Other principles of recovery-oriented care and support”).

In addition, Table 2 shows the average score on all individual items of the ART monitor. The average score on all items was 2.70. High scoring items were “Safety management system”, “Psychiatrist”, “Somatic care”, “Reachability”, and “Conflict control and personal safety”. The five lowest scoring items were “Cooperation with FACT and other outpatient care teams”, “Peer worker and family peer worker”, “Occupational therapist”, “Regional teams” and “Digital diagnosis”. Half the structurally high- or low-scoring items had only scoring options of 1, 3, or 5, which indicates that these items might not be distinctive enough.

**Construct validity**

In order to assess the construct validity, two groups of teams were compared. For group 1 (n = 7, the expected low-scoring group), the audit was the starting point of the implementation process. Within group 2 (n = 8, expected high-scoring group), the duration of implementation varied between six months and three years. Table 3 provides an overview of the average scores of the participating teams. Note that this corresponds to the median value of 2.45 and 2.97 (see Fig. 1). A significant difference was found between the two groups (t(13) = 2.53, p < 0.05). The average scores were 2.42 (SD = 0.44) and 2.95 (SD = 0.37) for groups 1 and 2, respectively. This indicates that the ART monitor is able to discriminate between the two groups.

**Inter-rater reliability**

Table 2 provides an overview of the inter-rater reliability of the items in the ART monitor, including the percentage of exact agreement and the percentage of agreement allowing a one-point difference in the case of a five point scale. Based on the exact agreement, six items (12%) scored above the threshold of 75%, and nineteen items (37%) scored above the threshold of 65%. When allowing a one-point difference, 30 items (59%) scored above the threshold of 75%, and 45 items (88%) scored above the threshold of 65%. This shows that when using a high standard, inter-rater reliability was weak; yet, the differences between the auditors were not that large since, when allowing for a one-point difference and a threshold of 65%, the agreement was strong.

**Finalizing the ART monitor**

Based on the inter-rater reliability and content validity results, some changes were made to the ART monitor items. First, scoring options 2 and 4 were added to the sixteen items only allowing a score of 1, 3, or 5. This did not entail a change in the items. Second, three items (“Caseload”, “Rooming in”, and “Regional teams”) were removed because their content was already found in other items. This can be regarded as a small change in the instrument. Third, three items (“Leadership and pioneers in the team”, “Mild intellectual disabilities”, and “Attention to safety”) were added based on the feedback of the auditors and teams. Also, some criteria were added to existing items. The addition of new items can be considered a large change; however, the addition of new criteria is a small change. Fourth, items were clarified or specified. The description of a number of items was slightly rephrased or a definition was added for clarification. Mainly items that received a great deal of feedback and had a low inter-rater reliability were critically evaluated for possible semantic improvements to ensure the proper comprehension and scoring of the items. Also, for some items, a distinction was made between two settings, namely a clinical ward and a sheltered housing facility. Finally, the titles of five domains were rephrased; for example, the title of the domain “Team process” was rephrased into “Team culture and vision”; and some items were moved to other domains to make the structure of the instrument more coherent; for instance, items that focus on organizational elements of the model such as “Intake”, “Care coordination meeting”, “Systematic risk assessment”, and “Digital whiteboard”, were moved from the domain “Recovery-oriented care and support” to the domain “Organization of care”. The clarification, specification, and replacement of items did not result in a change in
### Table 2  Average score and inter-rater reliability per item of the ART monitor (N = 15)

| Item                                                                 | Average score (SD) | Exact Agreement | Agreement allowing 1-point difference |
|----------------------------------------------------------------------|--------------------|-----------------|---------------------------------------|
| **Team structure**                                                    |                    |                 |                                       |
| 1. Caseload              | 3.27 (1.64)        | 66.7%           | -                                     |
| 2. Team composition      | 2.77 (1.14)        | 26.7%           | 86.7%                                 |
| 3. Peer worker and family peer worker                               | 1.37 (0.67)        | 80.0%           | 100.0%                                |
| 4. Nurses                | 3.87 (1.14)        | 53.3%           | 66.7%                                 |
| 5. Nurse practitioner    | 2.70 (1.66)        | 53.3%           | 86.7%                                 |
| 6. Social workers/residential support worker                       | 3.27 (1.80)        | 73.3%           | 100.0%                                |
| 7. Occupational therapist                                         | 1.37 (0.77)        | 86.7%           | 93.3%                                 |
| 8. Psychiatrist          | 3.87 (1.39)        | 73.3%           | 100.0%                                |
| 9. Health care psychologist/behavioral specialist                   | 2.97 (1.85)        | 73.3%           | 80.0%                                 |
| 10. Extra disciplines    | 3.17 (1.05)        | 53.3%           | 100.0%                                |
| **Team process**                                                    |                    |                 |                                       |
| 11. Vision and working method                                      | 2.53 (1.01)        | 66.7%           | -                                     |
| 12. Community participation                                        | 2.27 (1.08)        | 33.3%           | 86.7%                                 |
| 13. Hospitality and presence                                       | 3.43 (0.73)        | 46.7%           | 93.3%                                 |
| 14. Attitude of staff                                              | 2.60 (0.81)        | 60.0%           | 86.7%                                 |
| 15. Active recovery                                                | 2.53 (0.86)        | 66.7%           | -                                     |
| 16. Working in the triad                                           | 3.07 (0.37)        | 93.3%           | -                                     |
| **Recovery-oriented care and support**                              |                    |                 |                                       |
| 17. Intake                                                           | 2.23 (0.84)        | 26.7%           | 73.3%                                 |
| 18. Care coordination meeting (CCM)                                 | 2.40 (1.19)        | 46.7%           | 86.7%                                 |
| 19. Revitalize or build resource group                              | 2.33 (0.84)        | 33.3%           | 73.3%                                 |
| 20. Introduce recovery                                             | 2.67 (1.06)        | 66.7%           | -                                     |
| 21. Needs, strengths, and wishes                                   | 2.73 (1.02)        | 46.7%           | 80.0%                                 |
| 22. Integrated treatment and recovery plan                          | 3.00 (0.91)        | 26.7%           | 80.0%                                 |
| 23. Recovery interventions at four levels                          | 2.40 (1.30)        | 80.0%           | -                                     |
| 24. Systematic risk assessment                                       | 2.07 (1.11)        | 20.0%           | 80.0%                                 |
| 25. Early warning sign plan                                         | 3.03 (1.13)        | 46.7%           | -                                     |
| 26. Digital whiteboard                                             | 1.77 (1.31)        | 80.0%           | 93.3%                                 |
| 27. Rooming in                                                     | 2.20 (1.13)        | 73.3%           | -                                     |
| 28. Stepped care                                                    | 2.87 (1.07)        | 33.3%           | 86.7%                                 |
| 29. Recovery assessment                                             | 2.13 (1.36)        | 66.7%           | -                                     |
| **Other principles of recovery-oriented care and support**          |                    |                 |                                       |
| 30. Mental health care standards                                    | 2.37 (0.81)        | 46.7%           | 73.3%                                 |
| 31. Somatic care                                                    | 3.87 (1.14)        | 53.3%           | -                                     |
| 32. Medication policy                                               | 3.80 (0.81)        | 20.0%           | 86.7%                                 |
| 33. Dual diagnosis                                                  | 1.73 (0.91)        | 60.0%           | 80.0%                                 |
| **Organization of care**                                            |                    |                 |                                       |
| 34. Cooperation with FACT and other outpatient care teams             | 1.27 (0.87)        | 80.0%           | -                                     |
| 35. Admission and discharge                                         | 2.37 (1.19)        | 40.0%           | 73.3%                                 |
| 36. Care process and consultation                                   | 2.27 (1.53)        | 73.3%           | 80.0%                                 |
| 37. Waiting list                                                    | 2.47 (1.50)        | 53.3%           | 80.0%                                 |
| 38. Reachability                                                    | 4.03 (1.19)        | 26.7%           | 73.3%                                 |
| 39. Regional teams                                                  | 1.63 (0.93)        | 73.3%           | -                                     |
| 40. ART-improvement curve                                           | 2.17 (1.44)        | 60.0%           | 80.0%                                 |
| **Professionalization**                                            |                    |                 |                                       |
| 41. Reflection                                                      | 2.13 (1.46)        | 66.7%           | -                                     |
| 42. Training and education                                          | 2.13 (0.86)        | 26.7%           | 60.0%                                 |
| 43. Knowledge of regional network                                   | 2.60 (1.22)        | 66.7%           | -                                     |
Discussion

The focus of this study was to evaluate the psychometric properties of the ART monitor. Content validity, construct validity, and inter-rater reliability of the instrument were investigated. First, regarding content validity, auditors and teams perceived the ART monitor as a useful instrument. Second, with regard to construct validity, a significant difference in scores on the ART monitor was found between the teams that were at the start of the implementation process (group 1) and teams that had been working with the ART model longer (group 2).

Third, more than half the items (59%) had an inter-rater agreement of more than 75%, and the majority of the items (88%) had an inter-rater agreement of over 65%, when allowing for a one-point difference in scores. Items that scored low, in combination with feedback from auditors and teams, were revised. Most revisions were minor, simply involving scoring option additions, clarification and specification of items, and removal of redundancies. The addition of three items can be regarded as a larger change.

The approach in the current study was similar to that in the research focusing on the HIC monitor for acute psychiatric wards [25]. Scores on the ART monitor appeared to be less consistent when compared to the results of the HIC study, specifically the lower percentage of agreement and the larger number of revisions that were needed. An explanation could be that the settings in which the ART model is being implemented are more diverse than the HIC setting. ART settings range from closed long-stay wards to housing facilities; whereas HIC is being implemented in acute psychiatric wards, which are more comparable throughout the country. In addition, due to the length of admissions, the care provided by an ART team might be less structured compared to that provided at an HIC ward.

The ART model is a comprehensive and complex care model. Comparable to the fidelity measures Teague et al. [28] identified, the ART monitor includes items focusing on both the process and structural components of care and support. The content of the ART monitor is comparable to that of other instruments, such as the QuIRC and the ROPI used in long-term mental health care [17, 18]. The ART monitor and QuIRC include standards for disciplines, staff competencies, and housing. The QuIRC is a

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Table 2 (continued)

| Item | Average score (SD) | Exact Agreement | Agreement allowing 1-point difference |
|------|--------------------|-----------------|--------------------------------------|
| 44. Team spirit | 3.40 (0.93) | 46.7% | 86.7% |
| Healing environment | | | |
| 45. Healthy living environment | 1.93 (1.02) | 53.3% | 93.3% |
| 46. Housing firstᵃ | 1.77 (1.28) | 46.7% | - |
| 47. Housing conditions | 2.63 (1.00) | 26.7% | 80.0% |
| Safety | | | |
| 48. Safety management system | 4.47 (0.73) | 60.0% | 86.7% |
| 49. Conflict management and personal safetyᵇ | 4.20 (1.35) | 60.0% | - |
| 50. Cooperation agreements on safety | 3.23 (1.38) | 40.0% | 80.0% |
| Reduction of coercion | | | |
| 51. Evaluation of coercive measures | 3.03 (1.50) | 33.3% | 53.3% |

ᵃ Item with scoring options 1, 3, and 5 ᵇ Item with scoring options 1, 2, 4, and 5

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Table 3 Average scores of participating teams

| Group | Team | Average score |
|-------|-----|--------------|
| Group 1: Expected low-scoring group | 1 | 1.87 |
| | 2 | 2.03 |
| | 3 | 2.08 |
| | 4 | 2.45 |
| | 5 | 2.70 |
| | 6 | 2.90 |
| | 7 | 2.93 |
| Group 2: Expected high-scoring group | 8 | 2.27 |
| | 9 | 2.68 |
| | 10 | 2.89 |
| | 11 | 2.95 |
| | 12 | 3.00 |
| | 13 | 3.08 |
| | 14 | 3.18 |
| | 15 | 3.52 |
management tool; whereas the ROPI and the ART monitor are scored by independent auditors, thus providing a more holistic and independent evaluation of the quality of care. In contrast to the ROPI and QuIRC, the ART monitor is based on the ART model as a broadly shared vision developed in collaboration with many stakeholders. By breaking down the fundamental contents of the ART model into smaller parts (i.e., the individual items), teams have more concrete guidance for their implementation process. This makes the ART monitor a valuable instrument for providing a detailed overview of the situation within a team, assessed by independent auditors. For future research, including either the ROPI or QuIRC will be valuable for investigating the predictive validity of the ART monitor, in combination with outcomes on the service user level.

A strength of the current study is the set-up of the data collection, namely through a network of auditors, creating a Community of Practice [29]. This not only allowed for data collection, but it also created an opportunity for sharing knowledge and experiences, so that implementation of care according to the ART model was supported. Moreover, fruitful cooperation has been established for scientific evaluation of the ART monitor. Auditors and teams perceived the audits as inspiring, and in general, teams valued the feedback based on the audit results. This monitoring and feedback allowed them to critically reflect together on the care and support they provide, thereby contributing to the degree of compliance with the ART model within individual teams [11]. Points for improvements retrieved from the audits and subsequent discussions were adopted by teams in quality and policy documents. Teams that were at the start of their implementation process particularly benefited from participation in this study, because it allowed them to review their care process in a more structured manner than normal. By including these teams, it was ensured that the content of the ART monitor is clear for people with less experience with the ART model.

However, there are also limitations. First, only the scores of the ‘regular’ care professionals were included. In the development of the ART monitor, we aimed at a usable instrument for people with various backgrounds. Yet, in practice, this did not work out exactly as we anticipated. Limited knowledge of the structure of clinical records was indicated to be a barrier for auditors without the background of ‘regular’ care professionals. In addition, differences in scores could also have been the result of the limitations in the descriptions of the items in the ART monitor itself, which have undergone slight revisions based on this research. A third explanation could be that (family) peer workers and professionals with a ‘regular’ care background differ in their views on and expectations of recovery-oriented care, resulting in a different weighting of certain criteria of the ART monitor. In the current research, we were not able to look into
Conclusion
This study focused on the evaluation of the psychometric properties of the ART monitor and further improvement of the instrument in close collaboration with Dutch mental health care organizations. The evaluation of the content validity, construct validity, and inter-rater reliability provided fruitful input for these goals. We concluded that the revised ART monitor is feasible and useful in mental health care practice. Continuous refinement and adaptation will be necessary as the field progresses and changes over time. Further evaluation of the psychometric properties of the revised ART monitor should be part of future research. This should include examining whether the inter-rater reliability of previously low-scoring items has improved as a result of the refinements. Furthermore, other psychometric properties, such as sensitivity to change and predictive validity, could be taken into account. In addition, future research should focus on the relationship between the degree of compliance with the ART model and outcomes such as quality of care and recovery of service users.

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Authors’ contributions
LvdM, JvW, ALvM, MK and YV contributed to the initial development process of the ART monitor. MK planned the data collection of this study. LJCZ performed the data collection and analysis of this study. The first draft of the manuscript was written by LJCZ. LvdM, JvW, HCWdV, GAMW and YV participated in the analysis as well as drafting and revising the manuscript. The author(s) read and approved the final manuscript.

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Availability of data and materials
The revised ART monitor is available in Dutch on http://art-psy.nl/wp-content/uploads/2019/11/ART-Monitor-Oktober-2019-gevalideerd.pdf. The English translation of the ART monitor is included in Additional file 2. For questions regarding the data retrieved in this study, the reader can contact the first author (LZ).

Declarations
Ethics approval and consent to participate
This study was approved by the Medical Ethical Committee and the Scientific Quality Committee of VUmc. Informed consent was obtained from all participants included in the study. Our research was conducted in accordance with the Declaration of Helsinki.

Consent for publication
The participants gave their permission for scientific publication.
Competing interests

The authors declare that they have no conflict of interest.

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