
Review

Intensive Longitudinal Methods Among Adults With Breast or Lung Cancer: Scoping Review

Joran Geeraerts¹, MSc; Kim de Nooijer¹, MSc, PhD; Lara Pivodic¹, MSc, PhD; Mark De Ridder², MSc, PhD, MD; Lieve Van den Block¹, MSc, PhD

¹End-of-Life Care Research Group, Vrije Universiteit Brussel, Brussels, Belgium

²Department of Radiotherapy, Universitair Ziekenhuis Brussel, Vrije Universiteit Brussel, Brussels, Belgium

Corresponding Author:

Joran Geeraerts, MSc

End-of-Life Care Research Group

Vrije Universiteit Brussel

Laarbeeklaan 103

Brussels, 1090

Belgium

Phone: 32 2 477 47 56

Email: joran.geeraerts@vub.be

Abstract

Background: Intensive longitudinal methods offer a powerful tool for capturing daily experiences of individuals. However, its feasibility, effectiveness, and optimal methodological approaches for studying or monitoring experiences of oncology patients remain uncertain.

Objective: This scoping review aims to describe to what extent intensive longitudinal methods with daily electronic assessments have been used among patients with breast or lung cancer and with which methodologies, associated outcomes, and influencing factors.

Methods: We searched the electronic databases (PubMed, Embase, and PsycINFO) up to January 2024 and included studies reporting on the use of these methods among adults with breast or lung cancer. Data were extracted on population characteristics, intensive monitoring methodologies used, study findings, and factors influencing the implementation of these methods in research and clinical practice.

Results: We identified 1311 articles and included 52 articles reporting on 41 studies. Study aims and intensive monitoring methodologies varied widely, but most studies focused on measuring physical and psychological symptom constructs, such as pain, anxiety, or depression. Compliance and attrition rates seemed acceptable for most studies, although complete methodological reporting was often lacking. Few studies specifically examined these methods among patients with advanced cancer. Factors influencing implementation were linked to both patient (eg, confidence with intensive monitoring system) and methodology (eg, option to use personal devices).

Conclusions: Intensive longitudinal methods with daily electronic assessments hold promise to provide unique insights into the daily lives of patients with cancer. Intensive longitudinal methods may be feasible among people with breast or lung cancer. Our findings encourage further research to determine optimal conditions for intensive monitoring, specifically in more advanced disease stages.

(*J Med Internet Res* 2024;26:e50224) doi: [10.2196/50224](https://doi.org/10.2196/50224)

KEYWORDS

diary; ecological momentary assessment; neoplasms; quality of life; self-report; telemedicine; scoping review; longitudinal methods; breast cancer; lung cancer; patients with cancer; cancer; intensive monitoring; advanced disease stages; mobile phone

Introduction

Background

People diagnosed with cancer, among which breast and lung cancer are the most prevalent diagnoses globally [1], often experience various problems and concerns that affect their quality of life and well-being across physical, psychological, social, and spiritual domains [2-6]. Understanding the fluctuations, interactions, and contextual variations of the multidimensional problems and concerns in patients' daily lives is crucial to gain a comprehensive view of these patients' quality of life and to optimize patient-centered care. Such insights could lead to, among others, improvements in drug schedules and personalized treatment decision-making [7] and the identification of novel care intervention targets by identifying contexts or states that aggravate or buffer against certain problems and concerns [8].

An effective way to gather insights into the daily and within-day variability of patients' quality of life and well-being is the use of intensive longitudinal methods. Bolger and Laurenceau [9] defined intensive longitudinal methods as "an umbrella term to encompass data collection methods that employ enough repeated measurements to model a change process for each subject." The authors specify a minimum number of 5 sequential assessments, as it enables the estimation of linear models within each participant [9]. Examples of such methods are daily diaries and ecological momentary assessments (EMAs), also known as experience sampling methods (ESM). While predominantly developed in psychological research, these methods recently gained more attention in other fields and clinical practice, including oncology, due to advancements in handheld computer technologies that enable easier implementation than traditional pencil-and-paper approaches [9-13]. Despite easier implementation of these methods, researchers and clinicians in the field of oncology still lack a clear understanding of available options for intensive longitudinal monitoring, their opportunities, pitfalls, and feasibility in populations experiencing high symptom burden. This underscores the need for a structured overview of the use and capabilities of these methods.

Currently, no systematically conducted literature review exists on the use of intensive longitudinal methods in monitoring people with cancer. One systematic review [14] provided the most recent overview of the use of EMA in people with cancer across 42 studies (23 and 8 studies included people with breast and lung cancer, respectively) and found considerable heterogeneity in the methodologies used. However, due to its inclusion criteria focusing solely on EMAs, a large group of studies monitoring patients on a once-daily basis was left out [14]. Furthermore, the review did not report on the barriers and facilitators that were encountered during the implementation of ESM, which is crucial information for optimal use in practice [14].

Objective

We aimed to describe to what extent intensive longitudinal methods with daily electronic assessments have been used among patients with breast or lung cancer, along with the methodologies used, associated outcomes, and influencing

factors. We limited the scope of this review to these patient groups with the most prevalent cancer diagnoses for feasibility reasons to provide a more nuanced picture for these methods among these groups and to inform our own ongoing ESM project among these patient groups [15]. More specifically, we described (1) the characteristics of the populations with breast or lung cancer among whom intensive longitudinal methods with daily electronic assessments have been used; (2) the objectives, design, and methods used; (3) the results obtained (including study findings and response-related results); and (4) the identified barriers and facilitators for implementing these methods in clinical and research practice.

Methods

Overview

We conducted a scoping review using a systematic search strategy to gain insight into the extent, range, and nature of current evidence on the use of intensive longitudinal methods with daily electronic assessments in people with breast or lung cancer, rather than providing evidence for a specific research question as in systematic reviews [16,17]. This manuscript adheres to the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) [18].

Eligibility Criteria

We included articles that met the following criteria: articles that (1) performed in people diagnosed with breast or lung cancer through self-report or proxy responding; (2) included people aged ≥ 18 years; (3) used *active* intensive longitudinal methods, meaning the conscious reporting of experiences rather than passive data collection through wearables without conscious participant involvement [12]; (4) collected self-reports using electronic devices or allowed participants to choose between electronic and pen-and-paper self-reports, resulting in a partial sample that opted for electronic assessments; (5) applied a measurement period of >24 hours, with ≥ 5 planned assessments, including at least 1 assessment per day; and (6) included original full-text articles in English, Dutch, or French.

Articles were excluded if they met one or both of the following criteria: articles that (1) were conducted in people in complete cancer remission and (2) concerned reviews, meta-analyses, notes, letters to editors, conference abstracts, or study protocols.

Search Strategy

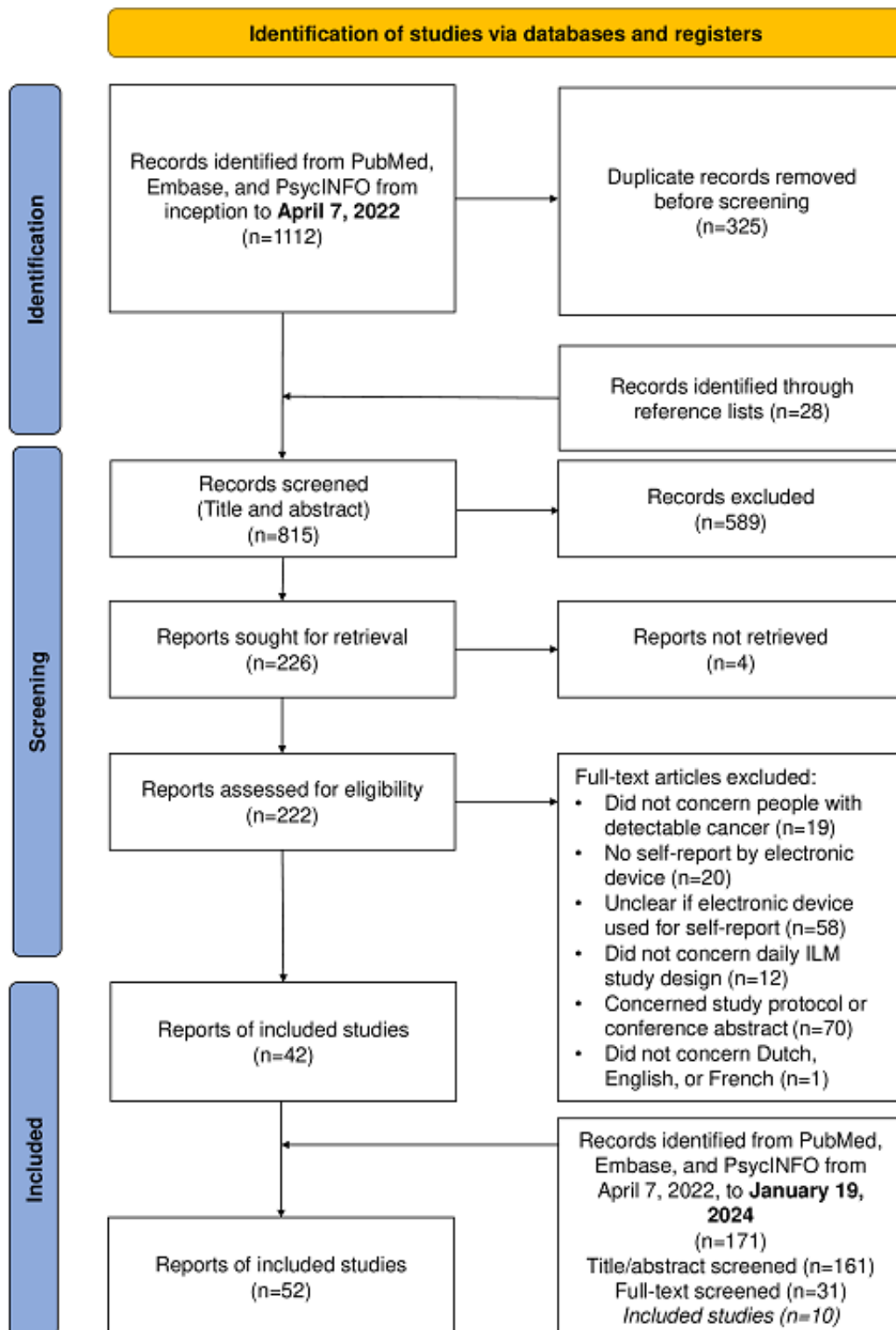
The initial literature search was conducted on April 7, 2022, and updated on January 19, 2024, both without restrictions for its time coverage. We searched 3 databases: PubMed, Embase, and PsycINFO. We consulted a librarian of the Vrije Universiteit Brussel for the development of the search strategy. Keywords included terms related to the population (eg, *cancer*) and methodology (eg, *ecological momentary assessment* and *daily diary*). The search strategy was validated in PubMed and translated to other databases. The full search strategy is provided in [Multimedia Appendix 1](#).

Study Selection

Figure 1 provides an overview of the selection procedure. Most duplicates were automatically detected and removed using EndNote (version 20; Clarivate) [19]. Screening followed a 2-step process. First, 2 researchers (JG and KdN) independently screened titles and abstracts and labeled them as relevant, irrelevant, or potentially relevant for inclusion. Additional duplicates not detected by EndNote were removed during this

step. Second, both reviewers screened the full texts of relevant and potentially relevant studies for final inclusion. JG and KdN resolved discrepancies in both steps through discussion and consensus and consulted a third and fourth reviewer (LP and LVdB), if necessary. JG screened articles found during the updated search. We used Rayyan (Qatar Computing Research Institute) [20] for reference management and manual removal of duplicates.

Figure 1. PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) flow diagram. ILM: intensive longitudinal method.



Data Extraction and Synthesis

JG extracted data into a precreated MS Excel (version 16; Microsoft Corp) spreadsheet. To ensure consistency and accuracy of the initial search, KdN independently completed the data extraction form for a random 10% sample of included articles. JG and KdN discussed and resolved discrepancies. JG extracted updated search results. The data extraction form was revised throughout the review process. It included study characteristics (ie, authors, year, country, and overarching study); sample characteristics (ie, sample size, site of primary tumor, stage of disease, mean age, proportion of female participants, and comparison group characteristics); study aims and design; system characteristics (ie, device, application, and operation system); daily questionnaire characteristics (ie, number of items, constructs measured daily, existing measurement instruments, or sources used); sampling schedule characteristics (ie, number of monitoring periods, duration of the monitoring periods, type of sampling scheme [ie, fixed or random signal-contingent, event-contingent, or interval-contingent] [9], daily prompt frequency, and approximate time interval between prompts); supportive features for participants; response-related results (ie, participation rate, attrition rate, proportion of completed prompts, and monetary incentives); and main study findings. We listed the barriers and facilitators for the implementation of the used method in research and clinical practice per study.

We have presented the study and sample characteristics, system and sampling schedule characteristics, and response-related results in the *Results* section, grouping articles reporting on the

same study. We conducted content analysis on the extracted barriers and facilitators, inductively categorizing the content in themes and subthemes.

Results

Of the 1311 identified articles, we screened 253 (19.3%) full-text articles for eligibility. We included 52 articles, describing 41 unique studies (Figure 1).

Population Characteristics

All the 41 studies were conducted in high-income countries, except for 1 (2%) study in Türkiye [21] (all study and sample characteristics are listed in [Multimedia Appendix 2](#)) [21-72]. We included 21 (51%) studies [22-44] reporting on samples of people with mixed primary tumor sites (including breast and lung cancer), 16 (39%) studies [21,45-66] on samples of people with breast cancer only, and 4 (10%) studies [67-72] on a sample of lung cancer only (Table 1). A total of 7 (17%) studies included patients' partners [25,38,39,43,45-50,63]. While 26 (63%) studies were conducted in people at differing stages of disease, of which 11 (42%) included up to stage III [21,48-51,54-59,61,63,73] and 15 (58%) included up to stage IV [23,25,26,31,32,34,36-39,41-44,53,64,69,70], 6 (15%) studies [24,30,33,35,45-47,52] specifically focused on people with stage IV cancer. Sample sizes ranged from 4 [29] to 344 [42] participants, with a mean of 54.3 (SD 56.4). The mean ages were 51 (SD 4.7) years for patients with breast cancer, 65 (SD 2.8) years for patients with lung cancer, and 58 (SD 5.7) years for patients with mixed primary tumor sites. None of the studies used proxy responding.

Table 1. Study and sample characteristics of the included studies (n=41).

Characteristics	Frequency of studies, n (%)	Reference, year
Primary tumor sites		
Breast	16 (39)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Cai et al [51], 2020 • Carson et al [52], 2021 • Çınar et al [21], 2021 • Dasch et al [53], 2010 • Kim et al [60], 2016 • Lim et al [64], 2022 • Min et al [61], 2014 • Pinto et al [54], 2021 • Ratcliff et al [55], 2014 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Stone et al [59], 2016 • Sztacharńska et al [62], 2019 • Xu et al [63], 2019
Lung	4 (10)	<ul style="list-style-type: none"> • Dunsmore et al [72], 2023 • Maguire et al [71], 2015 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Steffen et al [69], 2018; Steffen et al [70], 2020
Mixed	21 (51)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Besse et al [34], 2016 • Chumbler et al [23], 2007 • Coolbrandt et al [40], 2022 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • Kearney et al [28], 2006 • Langer et al [25], 2018 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Lee et al [41], 2023 • Maguire et al [29], 2005 • McCall et al [30], 2008 • McCann et al [31], 2009; Kearney et al [32], 2009 • Mooney et al [26], 2014 • Nordhausen et al [42], 2022 • Passardi et al [36], 2022 • Schuler et al [43], 2023 • van den Berg et al [27], 2022 • van Roozendaal et al [44], 2023 • Weaver et al [33], 2014 • Yap et al [37], 2013
Included patients and partners	7 (17)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018; • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Langer et al [25], 2018; LeBaron et al [38], 2022 • LeBaron et al [39], 2023 • Schuler et al [43], 2023 • Xu et al [63], 2019
Disease stage		
I to II	1 (2)	<ul style="list-style-type: none"> • Shiyko et al [68], 2014; Shiyko et al [67], 2019

Characteristics	Frequency of studies, n (%)	Reference, year
III to IV	9 (22)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Carson et al [52], 2021 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Lim et al [64], 2022 • McCall et al [30], 2008 • Schuler et al [43], 2023 • Weaver et al [33], 2014
Mixed	20 (49)	<ul style="list-style-type: none"> • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Besse et al [34], 2016 • Cai et al [51], 2020 • Chumbler et al [23], 2007 • Çınar et al [21], 2021 • Coolbrandt et al [40], 2022 • Dasch et al [53], 2010 • Langer et al [25], 2018 • McCann et al [31], 2009; Kearney et al [32], 2009 • Min et al [61], 2014 • Mooney et al [26], 2014 • Pinto et al [54], 2021 • Ratcliff et al [55], 2014 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [63], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Stone et al [59], 2016 • van Roozendaal et al [44], 2023 • Xu et al [63], 2019 • Yap et al [37], 2013
Not fully mentioned	11 (27)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Dunsmore et al [72], 2023 • Kearney et al [28], 2006 • Kim et al [60], 2016 • Lee et al [41], 2023 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • Nordhausen et al [42], 2022 • Passardi et al [36], 2022 • Sztacharańska et al [62], 2019 • van den Berg et al [27], 2022

Sample size

Characteristics	Frequency of studies, n (%)	Reference, year
4-20	9 (22)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Cai et al [51], 2020 • Hachizuka et al [35], 2010 • Kearney et al [28], 2006 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • Ratcliff et al [55], 2014 • Schuler et al [43], 2023
21-50	14 (34)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Carson et al [52], 2021 • Chumbler et al [23], 2007 • Çınar et al [21], 2021 • Dunsmore et al [72], 2023 • Harper et al [24], 2012 • McCall et al [30], 2008 • Min et al [61], 2014 • Passardi et al [36], 2022 • Pinto et al [54], 2021 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Sztacharńska et al [62], 2019 • van Roozendaal et al [44], 2023 • Weaver et al [33], 2014
51-100	13 (32)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Dasch et al [53], 2010 • Kim et al [60], 2016 • Lim et al [64], 2022 • McCann et al [31], 2009; Kearney et al [32], 2009 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Solk et al [56], 2020; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Stone et al [59], 2016 • van den Berg et al [27], 2022 • Xu et al [63], 2019 • Yap et al [37], 2013
100-344	5 (12)	<ul style="list-style-type: none"> • Coolbrandt et al [40], 2022 • Langer et al [25], 2018 • Lee et al [41], 2023 • Mooney et al [26], 2014 • Nordhausen et al [42], 2022
Mean age (years)		

Characteristics	Frequency of studies, n (%)	Reference, year
40-50	10 (24)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Çınar et al [21], 2021 • Kim et al [60], 2016 • Langer et al [25], 2018 • Min et al [61], 2014 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Sztacharńska et al [62], 2019 • van Roozendaal et al [44], 2023 • Xu et al [63], 2019 • Yap et al [37], 2013
51-60	19 (46)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Besse et al [34], 2016 • Cai et al [51], 2020 • Carson et al [52], 2021 • Coolbrandt et al [40], 2022 • Dasch et al [53], 2010 • Harper et al [24], 2012 • Lee et al [41], 2023 • Lim et al [64], 2022 • McCann et al [31], 2009; Kearney et al [32], 2009 • Mooney et al [26], 2014 • Pinto et al [54], 2021 • Ratcliff et al [55], 2014 • Schuler et al [43], 2023 • Stone et al [59], 2016 • van den Berg et al [27], 2022 • Weaver et al [33], 2014
61-70	9 (22)	<ul style="list-style-type: none"> • Chumbler et al [23], 2007 • Dunsmore et al [72], 2023 • Hachizuka et al [35], 2010 • Maguire et al [71], 2015 • McCall et al [30], 2008 • Nordhausen et al [42], 2022 • Passardi et al [36], 2022 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Steffen et al [69], 2018; Steffen et al [70], 2020
Not mentioned	3 (7)	<ul style="list-style-type: none"> • Kearney et al [28], 2006 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Maguire et al [29], 2005

Study design as reported by study authors

Characteristics	Frequency of studies, n (%)	Reference, year
Observational	30 (73)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Chumbler et al [23], 2007 • Coolbrandt et al [40], 2022 • Dasch et al [53], 2010 • Dunsmore et al [72], 2023 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • Kearney et al [28], 2006 • Kim et al [60], 2016 • Langer et al [25], 2018 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Lee et al [41], 2023 • Maguire et al [71], 2015 • McCall et al [30], 2008 • Min et al [61], 2014 • Nordhausen et al [42], 2022 • Pinto et al [54], 2021 • Ratcliff et al [55], 2014 • Schuler et al [43], 2023 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Stone et al [59], 2016 • van den Berg et al [27], 2022 • van Roozendaal et al [44], 2023 • Xu et al [63], 2019 • Yap et al [37], 2013
Interventional	11 (27)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Cai et al [51], 2020 • Carson et al [52], 2021 • Çınar et al [21], 2021 • Lim et al [64], 2022 • Maguire et al [29], 2005 • McCann et al [31], 2009; Kearney et al [32], 2009 • Mooney et al [26], 2014 • Passardi et al [36], 2022 • Sztacharańska et al [62], 2019 • Weaver et al [33], 2014

Study objectives

Characteristics	Frequency of studies, n (%)	Reference, year
Feasibility, usability, or validity	19 (46)	<ul style="list-style-type: none"> Besse et al [34], 2016 Cai et al [51], 2020 Chumbler et al [23], 2007 Coolbrandt et al [40], 2022 Hachizuka et al [35], 2010 Harper et al [24], 2012 Kearney et al [28], 2006 Kim et al [60], 2016 LeBaron et al [38], 2022 Lee et al [41], 2023 Maguire et al [29], 2005 McCall et al [30], 2008 Min et al [61], 2014 Nordhausen et al [42], 2022 Passardi et al [36], 2022 Schuler et al [43], 2023 Solk et al [56], 2019 Stone et al [59], 2016 van den Berg et al [27], 2022 Yap et al [37], 2013
Trajectory or relationship of variables	17 (41)	<ul style="list-style-type: none"> Aigner et al [22], 2016 Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 Belcher et al [48], 2011; Pasipanodya et al [49], 2012 Otto et al [50], 2015 Dasch et al [53], 2010 Dunsmore et al [72], 2023 Langer et al [25], 2018 LeBaron et al [39], 2023 Pinto et al [54], 2021 Ratcliff et al [55], 2014 Shiyko et al [67], 2019 Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 Steffen et al [69], 2018; Steffen et al [70], 2020 van Roozendaal et al [44], 2023 Weaver et al [33], 2014 Xu et al [63], 2019
Effectiveness of methods as intervention	4 (10)	<ul style="list-style-type: none"> Çınar et al [21], 2021 McCann et al [31], 2009; Kearney et al [32], 2009 Mooney et al [26], 2014 Maguire et al [71], 2015
Effectiveness of other interventions	3 (7)	<ul style="list-style-type: none"> Carson et al [52], 2021 Lim et al [64], 2022 Sztacharańska et al [62], 2019
Introduce statistical approach	1 (2)	<ul style="list-style-type: none"> Shiyko et al [68], 2014

Study Design and Objectives

Of the 41 studies, 30 (73%) [22-25,27,28,30,37-50,53-61,63,65-67,69-72] used intensive methods in observational study designs, whereas 11 (27%) [21,26,29,31-34,36,51,52,62,64] used them in interventional studies. While 38% (20/52) of the articles [23,24,27-30,33,34,36-38,40-43,51,56,59-61] focused on the intensive method's feasibility, usability, or validity, other articles investigated the prevalence or trajectory of measured variables or relationships between those variables [22,25,39,44-50,53-55,57,58,63,65-67,69,70,72], the effectiveness of the intensive methods as an intervention

[21,26,31,32,71], or the effectiveness of other interventions [52,62,64] or introduced a novel statistical approach [68].

Data Collection Methods

Daily Measured Constructs

Of the 41 studies, 30 (73%) [23-25,27-34,36,37,40-42,44-50,52-59,62,63,65-72] used items adapted from previous studies or scales (study details are listed in [Multimedia Appendix 3](#)) [21-72]. Some of the most frequently recurring questionnaires were the Common Toxicity Criteria Adverse Events grading system [29,31-33,37,41,74], EORTC Core Quality of Life Questionnaire (EORTC-QLQ-C30)

[24,42,69,70,75], and the Positive and Negative Affect Schedule-Expanded scale [48-50,53,69,70,76]. Measured constructs covered physical, psychological, and social domains; behaviors and intentions; daily events; sleep quality; and general quality of life. The physical domain was the most assessed domain, with the most frequently measured constructs being pain [22,23,26,27,30,34,35,38-41,45-47,52,54,56,57,59,65-68,70] and fatigue [23,26-32,35,40,41,44,54-57,59,65,66,70]. Anxiety [22,26,35,41,51,54,56,57,59-61,65,66,72] and depression [26,35,51,56,57,59,61,65,66] were the most frequently measured constructs in the psychological domain, and social support [25,45,48,50,62] and communication [25,38,39,46,49,50,63]

were the most frequently measured constructs in the social domain. Frequently measured behavioral constructs included medication use [22,36,38-40,47,61,64] and physical activity [38,39,56,57,65,66].

Sampling Schedule Characteristics

Of the 41 studies, 23 (56%) [21-24,26-28,30,37-41,43,48,50-53,59,61,62,69,70,72] required patients to fill in the questionnaire once per day, while 6 (15%) studies [25,29,31-34,67,68] required 2 completions daily, and 7 (17%) studies [35,44-47,54-58,63,65,66] required 3-6 completions daily (Table 2). Moreover, 5 (12%) studies [36,42,60,64,71] did not report the specific amount.

Table 2. Data collection methods used in the included studies (n=41).

Data collection methods	Frequency of studies, n (%)	Reference, year
Sampling schedule		
Once daily	23 (56)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Cai et al [51], 2020 • Carson et al [52], 2021 • Chumbler et al [23], 2007 • Çınar et al [21], 2021 • Coolbrandt et al [40], 2022 • Dasch et al [53], 2010 • Dunsmore et al [72], 2023 • Harper et al [24], 2012 • Kearney et al [28], 2006 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Lee et al [41], 2023 • McCall et al [30], 2008 • Min et al [61], 2014 • Mooney et al [26], 2014 • Schuler et al [43], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Stone et al [59], 2016 • Sztachañska et al [62], 2019 • van den Berg et al [27], 2022 • Yap et al [37], 2013
Twice daily	6 (15)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Langer et al [25], 2018 • Maguire et al [29], 2005 • McCann et al [31], 2009; Kearney et al [32], 2009 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Weaver et al [33], 2014
3-6 times daily	7 (17)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Hachizuka et al [35], 2010 • Pinto et al [54], 2021 • Ratcliff et al [55], 2014 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • van Roozendaal et al [44], 2023 • Xu et al [63], 2019
Not mentioned	6 (15)	<ul style="list-style-type: none"> • Kim et al [60], 2016 • Lim et al [64], 2022 • Maguire et al [71], 2015 • Nordhausen et al [42], 2022 • Passardi et al [36], 2022
Sampling type^a		
Fixed signal-contin- gent	15 (37)	<ul style="list-style-type: none"> • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Besse et al [34], 2016 • Cai et al [51], 2020 • Coolbrandt et al [40], 2022 • Dunsmore et al [72], 2023 • Hachizuka et al [35], 2010 • Langer et al [25], 2018 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Min et al [61], 2014 • Passardi et al [36], 2022 • Schuler et al [43], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Xu et al [63], 2019 • Yap et al [37], 2013

Data collection methods	Frequency of studies, n (%)	Reference, year
Random signal-contingent	7 (17)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Hachizuka et al [35], 2010 • Pinto et al [54], 2021 • Ratcliff et al [55], 2014 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2021; Welch et al [65], 2023; Whitaker et al [66], 2023 • van Roozendaal et al [44], 2023
Interval-contingent	6 (15)	<ul style="list-style-type: none"> • Çınar et al [21], 2021 • Dasch et al [53], 2010 • McCall et al [30], 2008 • Stone et al [59], 2016 • Sztachańska et al [62], 2019 • Weaver et al [33], 2014
Event-contingent	6 (15)	<ul style="list-style-type: none"> • Hachizuka et al [35], 2010 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Maguire et al [29], 2005 • McCall et al [30], 2008 • McCann et al [31], 2009; Kearney et al [32], 2009 • Schuler et al [43], 2023
Not clearly mentioned	15 (37)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Carson et al [52], 2021 • Chumbler et al [23], 2007 • Harper et al [24], 2012 • Kearney et al [28], 2006 • Kim et al [60], 2016 • Lee et al [41], 2023 • Lim et al [64], 2022 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCann et al [31], 2009; Kearney et al [32], 2009 • Mooney et al [26], 2014 • Nordhausen et al [42], 2022 • Passardi et al [36], 2022 • van den Berg et al [27], 2022

Data collection period length (days)

Data collection methods	Frequency of studies, n (%)	Reference, year
5	1 (2)	<ul style="list-style-type: none"> • Yap et al [37], 2013
7	8 (20)	<ul style="list-style-type: none"> • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Cai et al [51], 2020 • Carson et al [52], 2021 • Dasch et al [53], 2010 • Dunsmore et al [72], 2023 • Hachizuka et al [35], 2010 • Kearney et al [28], 2006 • Pinto et al [54], 2021
8-13	3 (7)	<ul style="list-style-type: none"> • Otto et al [50], 2015 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Xu et al [63], 2019
14	7 (17)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Langer et al [25], 2018 • Maguire et al [29], 2005 • McCann et al [31], 2009; Kearney et al [32], 2009 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Sztachañska et al [62], 2019
>14	12 (29)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Çınar et al [21], 2021 • Lee et al [41], 2023 • Lim et al [64], 2022 • Maguire et al [71], 2015 • McCall et al [30], 2008 • Min et al [61], 2014 • Schuler et al [43], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Stone et al [59], 2016 • van den Berg et al [27], 2022 • Weaver et al [33], 2014
Variable per person	10 (24)	<ul style="list-style-type: none"> • Chumbler et al [23], 2007 • Coolbrandt et al [40], 2022 • Harper et al [24], 2012 • Kim et al [60], 2016 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Mooney et al [26], 2014 • Nordhausen et al [42], 2022 • Passardi et al [36], 2022 • Ratcliff et al [55], 2014 • van Roozendaal et al [44], 2023

Data collection devices for self-report assessments

Data collection methods	Frequency of studies, n (%)	Reference, year
Smartphone	11 (27)	<ul style="list-style-type: none"> • Cai et al [51], 2020 • Çınar et al [21], 2021 • Coolbrandt et al [40], 2022 • Langer et al [25], 2018 • Min et al [61], 2014 • Pinto et al [54], 2021 • Schuler et al [43], 2023 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • van den Berg et al [27], 2022 • van Roozendaal et al [44], 2023 • Xu et al [63], 2019
Smartwatch	2 (5)	<ul style="list-style-type: none"> • LeBaron et al [38], 2022; LeBaron et al [39], 2023
Handheld computer	8 (20)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • Kearney et al [28], 2006 • McCall et al [30], 2008 • Ratcliff et al [55], 2014 • Shiyko et al [68], 2014; Shiyko et al [67], 2019
Mobile device with telephone or SMS functionality	9 (22)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Carson et al [52], 2021 • Lee et al [41], 2023 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCann et al [31], 2009; Kearney et al [32], 2009 • Mooney et al [26], 2014 • Weaver et al [33], 2014 • Yap et al [37], 2013
Device with internet functionality	5 (12)	<ul style="list-style-type: none"> • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Dasch et al [53], 2010 • Dunsmore et al [72], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Stone et al [59], 2016
Specifically developed device	2 (5)	<ul style="list-style-type: none"> • Chumbler et al [23], 2007 • Nordhausen et al [42], 2022
Not mentioned	5 (12)	<ul style="list-style-type: none"> • Otto et al [50], 2015 • Kim et al [60], 2016 • Lim et al [64], 2022 • Passardi et al [36], 2022 • Sztacharańska et al [62], 2019

Device ownership

Data collection methods	Frequency of studies, n (%)	Reference, year
Patient-owned	19 (46)	<ul style="list-style-type: none"> • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Besse et al [34], 2016 • Cai et al [51], 2020 • Carson et al [52], 2021 • Çınar et al [21], 2021 • Coolbrandt et al [40], 2022 • Dasch et al [53], 2010 • Lee et al [41], 2023 • Min et al [61], 2014 • Mooney et al [26], 2014 • Pinto et al [54], 2021 • Schuler et al [43], 2023 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2021; Welch et al [65], 2023; Whitaker et al [66], 2023 • Stone et al [59], 2016 • van den Berg et al [27], 2022 • van Roozendaal et al [44], 2023 • Xu et al [63], 2019 • Yap et al [37], 2013
Provided by re-searcher	12 (29)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Chumbler et al [23], 2007 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • Kearney et al [28], 2006 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Nordhausen et al [42], 2022 • Ratcliff et al [55], 2014 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Weaver et al [33], 2014
Option to choose between patient-owned and re-search device	2 (5)	<ul style="list-style-type: none"> • Langer et al [25], 2018 • Steffen et al [69], 2019; Steffen et al [70], 2020
Not mentioned	10 (24)	<ul style="list-style-type: none"> • Otto et al [50], 2015 • Dunsmore et al [72], 2023 • Kim et al [60], 2016 • Lim et al [64], 2022 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCall et al [30], 2008 • McCann et al [31], 2009; Kearney et al [32], 2009 • Passardi et al [36], 2022 • Sztachañska et al [62], 2019

Data collection software^a

Data collection methods	Frequency of studies, n (%)	Reference, year
Smartphone apps	9 (22)	<ul style="list-style-type: none"> • Çınar et al [21], 2021 • Coolbrandt et al [40], 2022 • Kim et al [60], 2016 • Langer et al [25], 2018 • Min et al [61], 2014 • Pinto et al [54], 2021 • Schuler et al [43], 2023 • van den Berg et al [27], 2022 • van Roozendaal et al [44], 2023
Browser-based surveys (sent via chat, mail, or SMS)	6 (15)	<ul style="list-style-type: none"> • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Dasch et al [53], 2010 • Dunsmore et al [72], 2023 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Xu et al [63], 2019
SMS	3 (7)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Cai et al [51], 2020 • Yap et al [37], 2013
Interactive voice responding systems	4 (10)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Carson et al [52], 2021 • Lee et al [41], 2023 • Mooney et al [26], 2014
Other specifically developed software	12 (29)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Chumbler et al [23], 2007 • Kearney et al [28], 2006 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCann et al [31], 2009; Kearney et al [32], 2009 • Nordhausen et al [42], 2022 • Passardi et al [36], 2022 • Ratcliff et al [55], 2014 • Stone et al [59], 2016 • Weaver et al [33], 2014
Not mentioned	8 (20)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Otto et al [50], 2015 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • Lim et al [64], 2022 • McCall et al [30], 2008 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Sztacharska et al [62], 2019
Used conditional questionnaire items	7 (17)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Coolbrandt et al [40], 2022 • Langer et al [25], 2018 • Mooney et al [26], 2014 • Shiyko et al [68], 2014; Shiyko et al [67], 2019
Used different questionnaire lengths depending on prompt timing	5 (12)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Langer et al [25], 2018 • Ratcliff et al [55], 2014 • Schuler et al [43], 2023 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023

Data collection methods	Frequency of studies, n (%)	Reference, year
The number of questionnaire items		
1-20	20 (49)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Besse et al [34], 2016 • Carson et al [52], 2021 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • Kim et al [60], 2016 • Langer et al [25], 2018 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Min et al [61], 2014 • Mooney et al [26], 2014 • Nordhausen et al [42], 2022 • Ratcliff et al [55], 2014 • Schuler et al [43], 2023 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Stone et al [59], 2016 • van den Berg et al [27], 2022 • van Roozendaal et al [44], 2023 • Yap et al [37], 2013
21-40	6 (15)	<ul style="list-style-type: none"> • Dasch et al [53], 2010 • Dunsmore et al [72], 2023 • Lee et al [41], 2023 • Pinto et al [54], 2021 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Sztachañska et al [62], 2019
41-84	2 (5)	<ul style="list-style-type: none"> • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015
Not clearly mentioned	13 (32)	<ul style="list-style-type: none"> • Cai et al [51], 2020 • Chumbler et al [23], 2007 • Çınar et al [21], 2021 • Coolbrandt et al [40], 2022 • Kearney et al [28], 2006 • Lim et al [64], 2022 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCall et al [30], 2008 • McCann et al [31], 2009; Kearney et al [32], 2009 • Passardi et al [36], 2022 • Weaver et al [33], 2014 • Xu et al [63], 2019

Supportive features

Data collection methods	Frequency of studies, n (%)	Reference, year
Automated self-care advice	9 (22)	<ul style="list-style-type: none"> • Chumbler et al [23], 2007 • Coolbrandt et al [40], 2022 • Kearney et al [28], 2006 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCall et al [30], 2008 • McCann et al [31], 2009; Kearney et al [32], 2009 • Weaver et al [33], 2014 • Yap et al [37], 2013
Clinician alerts	9 (22)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Coolbrandt et al [40], 2022 • Kearney et al [28], 2006 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCann et al [31], 2009; Kearney et al [32], 2009 • Mooney et al [26], 2014 • Weaver et al [33], 2014 • Yap et al [37], 2013
Clinician could view summary of responses	5 (12)	<ul style="list-style-type: none"> • Coolbrandt et al [40], 2022 • Harper et al [24], 2012 • Kearney et al [28], 2006 • Min et al [61], 2014 • Nordhausen et al [42], 2022
Informational modules	2 (5)	<ul style="list-style-type: none"> • Çınar et al [21], 2021 • Passardi et al [36], 2022
Module allowing communication with clinicians	1 (2)	<ul style="list-style-type: none"> • Çınar et al [21], 2021
Patients received response summaries	2 (5)	<ul style="list-style-type: none"> • McCall et al [30], 2008 • Xu et al [63], 2019
Relaxation reminders	1 (2)	<ul style="list-style-type: none"> • Çınar et al [21], 2021
None mentioned	23 (56)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018; • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Carson et al [52], 2021 • Dasch et al [53], 2010 • Dunsmore et al [72], 2023 • Hachizuka et al [35], 2010 • Kim et al [60], 2016 • Langer et al [25], 2018 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Lee et al [41], 2023 • Lim et al [64], 2022 • Pinto et al [54], 2021 • Ratcliff et al [55], 2014 • Schuler et al [43], 2023 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], (2023) • Steffen et al [69], 2018; Steffen et al [70], 2020 • Stone et al [59], 2016 • Sztachañska et al [62], 2019 • van den Berg et al [27], 2022 • van Roozendaal et al [44], 2023

^aMultiple options possible per study.

Out of the 41 studies, 22 (54%) studies [25,34-40,43-51,54-58,61,63,65-70,72] applied signal-contingent sampling (ie, prompting respondents to complete the questionnaire) and 6 (15%) studies [21,30,33,53,59,62] applied interval-contingent sampling (ie, instructing respondents to complete the questionnaire at certain intervals), while 15 (37%) studies [22-24,26-29,31,32,36,41,52,60,64,71] did not specify the sampling method. Furthermore, 6 (15%) studies used event-contingent sampling on top of the other sampling methods; of these, 4 (67%) studies [29-32,38,39] instructed patients to complete the assessment when experiencing adverse events, 1 (17%) study [35] required the patients to assess when rescue medication was taken, and 1 (17%) study [43] prompted patients when a physiologically measured stress threshold was reached. Out of 22 signal-contingent sampling studies, 13 (59%) [25,34-37,43,48-51,61,63,69,70,72] prompted patients at fixed times, with times between prompts ranging from 3 to 24 hours. Moreover, 36% (8/22) of the studies [35,42,44-47,54-58,65-68] prompted patients at random times, of which 5 (62%) [35,44-47,55,67,68] randomly prompted within a fixed time block (eg, between 9 AM and midnight). Minimum time intervals between randomly timed prompts ranged from 30 minutes to 3 hours [45-47,54-58].

Of the 41 studies, 7 (17%) [31-33,52,54-58,65,66,71] had multiple data collection periods for each patient. While the most common data collection period lengths were 7 days [28,35,48-54,71,72] and 14 days [22,25,29,31,32,45-47,62,67,68], ranging from 1 to 336 days [42,77], 10 (24%) studies [23,24,26,36,38-40,42,44,55,60] mentioned differing study lengths for each patient (eg, based on patients' next chemotherapy visit) [55].

System Characteristics

Data collection devices and software varied substantively in the included studies (n=41), with 11 (27%) studies [21,25,27,40,43,44,51,54,56-58,61,63,65,66] using smartphones, 1 (2%) study using smartwatches [38,39], and 8 (20%) studies [22,24,28,30,35,45-47,55,67,68] using handheld computers for self-report assessments. Other studies used basic telephone and SMS text messaging functionality [26,34,37,41,51,52], internet functionality [48-50,53,56-59,65,66,69,70,72], and used a specifically developed device [23,38,39]. A total of 19 (46%) studies [21,26,27,34,37,40,41,43,44,48-54,56-59,61,63] used patients' devices, whereas 12 (29%) studies [22-24,28,30,33,35,38,39,42,45-47,55,67,68] provided devices to patients.

Different types of software were used, including smartphone apps [21,25,27,36,40,43,44,54,60,61,63,64], browser-based surveys [48-50,53,56-59,63,65,66,69,70,72], SMS text messaging [34,37,51], interactive voice responding systems [26,34,41,52], and other specifically developed software applications [22,23,28,29,31-33,38,39,42,55,71].

Questionnaire Length

Some studies (7/41, 17%) [25,26,38-40,43,45-50,65-68] used conditional items that were presented when a certain response was given to previous items and different questionnaires depending on the timing of the prompt (eg, the use of morning

prompts to assess sleep quality [55,56]). Most studies (20/41, 49%) [21-25,27-29,31-35,37-40,42-47,51,52,55-61,63,65-68] had questionnaire lengths ranging between 1 and 20 items, with the longest being 84 items (including conditional items) [48-50]. Several studies (13/41, 32%) [21,23,28-33,36,40,51,63,64,71] did not provide complete information on the number of items.

Supportive Features

Of 41 studies, 17 (41%) [21,23,24,26,28-34,36,37,40,42,61,63,71] provided supportive features; 9 (22%) studies [23,28-33,37,40,71] offered automated self-care advice to patients based on their responses directly after response submission, for instance, offering advice for managing reported symptoms, with severe symptoms triggering advice to contact a health care professional [73]. Also, 9 (22%) studies [26,28,29,31-34,37,40,71] automatically contacted health care professionals based on symptom severity (ie, clinician alerts). Some studies (2/41, 5%) [31,32,71] differentiated between different severities to indicate varying levels of need for immediate intervention (eg, amber and red alerts). A total of 6 (15%) studies [28,29,31-33,37,71] combined automated self-care advice and clinician alerts. One study [26] alerted clinicians based on responses given on domains other than physical symptoms, namely psychological variables (ie, depressive mood and anxiety) and distress caused by symptoms. Other supportive features included providing the opportunity to clinicians to view a summary or visualization of responses given by the patient [24,28,40,42,61] and providing patients with informational modules [21,36], modules allowing communication with clinicians [21,36], response summaries [30,63], and relaxation reminders [21].

Study-Reported Findings

Findings Concerning Methodological Evaluations

Intensive longitudinal methods that sampled once daily [23,26-28,30,37,40,42] or multiple times per day [33-35,38,43,56] were deemed feasible and acceptable for patients. These findings applied to various system characteristics, such as interactive voice response and SMS text messaging systems [26,34,37] and smartphone apps [27,40,43]. Compliance decreased over time in a 90-day study [61], with higher compliance among unemployed women. Patients believed in the method's ability to improve symptoms [29], symptom management [28,71], and communication with clinicians [71]. Moreover, patients had positive views on the usability of the methods [26,30,34,35,56,71] and felt reassured by using them [29,33].

Health care professionals had a positive view of the methods [71] and found them reassuring for patients, especially during out of hours [33], and clinically useful [26,30,37]. In addition, health care professionals thought that the methods could be helpful aids in timely interventions [29] and for assessing [28] and managing symptoms [28,29]. However, one study [24] reported that quality of life data was not used for making treatment decisions, and other studies [26,42,64] reported that clinicians rarely contacted the patients after receiving clinical alerts or monitored their responses. In one study [71], health

care professionals mentioned that reduced complexity of the system was needed to promote its utility.

Some studies (5/41, 12%) [34,36,41,51,59] compared intensive longitudinal methods with other scales and found agreement between the methods, such as depression ratings and Patient Health Questionnaire-9 [60,78]. One study [27] found a lack of agreement between the intensive methods and the Short Form Health Survey [79], but this concordance improved with higher compliance rates.

Findings Concerning Prevalence and Covariability of Constructs

Several studies (16/41, 39%) examined the prevalence and covariability of constructs ranging across multiple topics. For instance, 7 studies [25,45,46,48-50,63] reported findings related to the social dynamics between patients and their partners. One study [45] found greater reports of relationship interference when patients experienced more pain and lower arousal mood. Moreover, partners were more likely to provide support when patients experienced more tiredness and less active mood resulting from pain [45]. Another study on this topic [48] found that partners' reports of support provision were positively associated with feelings of relationship intimacy reported by patients.

Overall, studies investigated various topics such as physical activity, affect, and physical symptoms. For instance, studies [54,65] showed associations between sedentary behavior, affective valence, and fatigue at different time points, analog to other studies [57,66] that found within-person associations between physical activity and same-day affect, fatigue, pain, and others.

Findings Concerning the Intensive Methods as an Intervention

Of the 41 studies, 7 (17%) [21,23,26,31,32,34,71] investigated the impact of intensive longitudinal methods as an intervention tool to improve symptoms, for instance, by providing automated self-care advice to patients or alerting clinicians when a certain symptom threshold was reached [71]. Patients in the intervention groups reported lower distress [21], lower fatigue, and higher levels of hand-foot syndrome [32] than those in the control groups. Patient-reported benefits included improved communication with health care professionals and symptom management and reassurance that symptoms were being monitored at home [31]. After the intervention, patients reported increased quality of life [21,23], lower anxiety and drowsiness, lower pain [34], and higher self-care efficacy [71] than at the baseline. One study using clinician alerts [26] found no improvements in symptom severity, explained by clinicians rarely contacting patients after alerts.

Response-Related Results

Of the 41 studies, 21 (51%) [22-26,33,34,37,40,43-50,52-54,56-58,63,65-67,69-71] reported participation rates ranging from 23.6% to 90.3% (mean 52.9, SD 3.4; Table 3; Multimedia Appendix 4) [21-72]. Overall, 17 (41%) studies [23,25,26,30,34,35,37-40,43,44,51,55,61,63,64,71] reported attrition rates, ranging from 0% to 56.9% (mean 19.7%, SD 17.7%). Furthermore, 19 (46%) studies [22,27,28,31-33,36,45-50,52-54,56-60,62,65-70,76] provided other attrition indicators, while 29 (71%) studies [22-27,33-35,40,42,43,45-47,50-67,69,70,72] reported compliance rates ranging from 44.2% to 98% (mean 74.9%, SD 16.4%).

Table 3. Response-related results of the included studies (n=41).

Results and characteristics	Frequency of studies, n (%)	Reference, year
Participation rate		
23%-25%	3 (7)	<ul style="list-style-type: none"> Coolbrandt et al [73], 2021 Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 van Roozendaal et al [44], 2023
26%-50%	8 (20)	<ul style="list-style-type: none"> Aigner et al [22], 2016 Belcher et al [48], 2011; Pasipanodya et al [49], 2012 Otto et al [50], 2015 Carson et al [52], 2021 Dasch et al [53], 2010 Langer et al [25], 2018 Maguire et al [71], 2015 Xu et al [63], 2019 Yap et al [37], 2013
51%-75%	4 (10)	<ul style="list-style-type: none"> Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018; Pinto et al [54], 2021 Schuler et al [43], 2023 Weaver et al [33], 2014
76%-90%	6 (15)	<ul style="list-style-type: none"> Besse et al [34], 2016 Chumbler et al [23], 2007 Harper et al [24], 2012 Mooney et al [26], 2014 Shiyko et al [68], 2014; Shiyko et al [67], 2019 Steffen et al [69], 2018; Steffen et al [70], 2020
Not mentioned	19 (46)	<ul style="list-style-type: none"> Otto et al [50], 2015 Cai et al [51], 2020 Çınar et al [21], 2021 Dunsmore et al [72], 2023 Hachizuka et al [35], 2010 Kearney et al [28], 2006 Kim et al [60], 2016 LeBaron et al [38], 2022; LeBaron et al [39], 2023 Lee et al [41], 2023 Lim et al [64], 2022 Maguire et al [29], 2005 McCall et al [30], 2008 McCann et al [31], 2009; Kearney et al [32], 2009 Min et al [61], 2014 Nordhausen et al [42], 2022 Passardi et al [36], 2022 Ratcliff et al [55], 2014 Stone et al [59], 2016 Sztacharańska et al [62], 2019 van den Berg et al [27], 2022
Attrition rate		
0%-25%	12 (29)	<ul style="list-style-type: none"> Cai et al [51], 2020 Coolbrandt et al [40], 2022 Hachizuka et al [35], 2010 Harper et al [24], 2012 Langer et al [25], 2018 Min et al [61], 2014 Mooney et al [26], 2014 Ratcliff et al [55], 2014 Schuler et al [43], 2023 van Roozendaal et al [44], 2023 Xu et al [63], 2019 Yap et al [37], 2013

Results and characteristics	Frequency of studies, n (%)	Reference, year
26%-57%	6 (15)	<ul style="list-style-type: none"> • Besse et al [34], 2016 • Chumbler et al [23], 2007 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Lim et al [64], 2022 • Maguire et al [71], 2015 • McCall et al [30], 2008
Other indicators mentioned	18 (44)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018; • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Carson et al [52], 2021 • Dasch et al [53], 2010 • Kearney et al [28], 2006 • Kim et al [60], 2016 • Lee et al [41], 2023 • McCann et al [31], 2009; Kearney et al [32], 2009 • Passardi et al [36], 2022 • Pinto et al [54], 2021 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Stone et al [59], 2016 • Sztacharńska et al [62], 2019 • van den Berg et al [27], 2022 • Weaver et al [33], 2014
None mentioned	5 (12)	<ul style="list-style-type: none"> • Otto et al [50], 2015 • Çınar et al [21], 2021 • Dunsmore et al [72], 2023 • Maguire et al [29], 2005 • Nordhausen et al [42], 2022

Compliance rate

Results and characteristics	Frequency of studies, n (%)	Reference, year
44%-60%	6 (15)	<ul style="list-style-type: none"> • Otto et al [50], 2015 • Kim et al [60], 2016 • Min et al [61], 2014 • Ratcliff et al [55], 2014 • Schuler et al [43], 2023 • van den Berg et al [27], 2022
61%-80%	10 (24)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Besse et al [34], 2016 • Carson et al [52], 2021 • Coolbrandt et al [40], 2022 • Dunsmore et al [72], 2023 • Mooney et al [26], 2014 • Pinto et al [54], 2021 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Xu et al [63], 2019
81%-100%	13 (32)	<ul style="list-style-type: none"> • Cai et al [51], 2020 • Chumbler et al [23], 2007 • Dasch et al [53], 2010 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • Langer et al [25], 2018 • Lim et al [64], 2022 • Nordhausen et al [42], 2022 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023 • Steffen et al [69], 2018; Steffen et al [70], 2020 • Stone et al [59], 2016 • Sztacharańska et al [62], 2019 • Weaver et al [33], 2014
Other indicators mentioned	6 (15)	<ul style="list-style-type: none"> • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Lee et al [41], 2023 • Passardi et al [36], 2022 • van Roozendaal et al [44], 2023 • Yap et al [37], 2013
Not mentioned	6 (15)	<ul style="list-style-type: none"> • Çınar et al [21], 2021 • Kearney et al [28], 2006 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCall et al [30], 2008 • McCann et al [31], 2009; Kearney et al [32], 2009
Monetary incentives		
Amount based on the number of completed assessments	6 (15)	<ul style="list-style-type: none"> • Badr et al [45], 2010; Badr et al [46], 2013; Stephenson et al [47], 2018 • Belcher et al [48], 2011; Pasipanodya et al [49], 2012 • Otto et al [50], 2015 • Langer et al [25], 2018 • Pinto et al [54], 2021 • Ratcliff et al [55], 2014 <p>Steffen et al [69], 2018; Steffen et al [70], 2020</p>

Results and characteristics	Frequency of studies, n (%)	Reference, year
Fixed amount	5 (12)	<ul style="list-style-type: none"> • Cai et al [51], 2020 • Carson et al [52], 2021 • Stone et al [59], 2016 • LeBaron et al [38], 2022; LeBaron et al [39], 2023 • Solk et al [56], 2019; Phillips et al [57], 2020; Auster-Gussman et al [58], 2022; Welch et al [65], 2023; Whitaker et al [66], 2023
None provided	2 (5)	<ul style="list-style-type: none"> • Min et al [61], 2014 • van den Berg et al [27], 2022
Not specified	28 (68)	<ul style="list-style-type: none"> • Aigner et al [22], 2016 • Otto et al [50], 2015 • Besse et al [34], 2016 • Chumbler et al [23], 2007 • Çınar et al [21], 2021 • Coolbrandt et al [40], 2022 • Dasch et al [53], 2010 • Dunsmore et al [72], 2023 • Hachizuka et al [35], 2010 • Harper et al [24], 2012 • Kearney et al [28], 2006 • Kim et al [60], 2016 • Lee et al [41], 2023 • Lim et al [64], 2022 • Maguire et al [29], 2005 • Maguire et al [71], 2015 • McCall et al [30], 2008 • McCann et al [31], 2009; Kearney et al [32], 2009 • Mooney et al [26], 2014 • Nordhausen et al [42], 2022 • Passardi et al [36], 2022 • Schuler et al [43], 2023 • Shiyko et al [68], 2014; Shiyko et al [67], 2019 • Sztacharńska et al [62], 2019 • van Roozendaal et al [44], 2023 • Weaver et al [33], 2014 • Xu et al [63], 2019 • Yap et al [37], 2013

Overall, 32% (13/41) of the studies provided monetary incentives, of which 8 (62%) studies [25,45-50,54,55,59,69,70] based attainable monetary amounts on the number of completed assessments, while 5 (38%) [38,39,51,52,56-58,65,66,72] provided patients with fixed amounts. Attainable monetary amounts ranged from US \$40 to \$200.

Barriers and Facilitators

Most studies reported the barriers and facilitators regarding the implementation of their methods in research or clinical practice

(Table 4), either related to the person with cancer or the methods themselves. Some facilitating person-related factors included having confidence in using technology systems [31,56] and recognizing its clinical benefits [28,30,60]. Some person-related barriers were lack of smartphone ownership [40,61] and discomfort with technology [30,45-47,71]. However, inexperience with technology generally did not impact success with the study technologies [25,28,31,35]. However, smartphone users had higher compliance during an SMS protocol than basic phone users [37].

Table 4. Barriers and facilitators for the implementation of the method in practice and for research purposes, as stated by the papers' authors or extracted from the reported results.

Themes	Facilitators	Barriers
Factors related to the person with breast or lung cancer	<ul style="list-style-type: none"> • <i>Confidence</i> in their abilities to use technology systems [31,56] • Overall <i>preference for online diary</i> compared with paper diary [62] • Smartphone <i>users</i> had higher compliance than basic phone users [37] • <i>Recognize the clinical benefits</i> of using technology systems to report symptoms [28-30,42,60] and weigh these benefits against assessment burden [43] • <i>Willingness of patients</i> [30,42] • Patient <i>perceptions on the relevance</i> of the study to their needs [29] • <i>Sex, age, and diagnosis</i> did not impact compliance [42,43]; excluded participants appeared similar to the included participants [44] • (<i>Belief that</i>) <i>data are used</i> by clinicians [30,42,73] 	<ul style="list-style-type: none"> • <i>Lack of interest or motivation</i> to participate can lead to small sample size [22] and lower compliance [42] • <i>Time constraints</i> affect participation rate and compliance [22,42,45,46] • <i>Symptoms and side effects</i> due to (advanced stage) illness and treatment may cause increased burden during study period, problems with pressing buttons, lower participation and compliance rates, and bias due to missing data [38,42,45-47,51,55,56,69] • Men were more likely to not use monitoring than women [26] • <i>Not owning a smartphone</i> prevents certain patients from using the monitoring system and thus participating in the study [61,73] • <i>Inexperience and discomfort about using the technology system</i> at start of the study period; particularly, <i>older adults</i> were less likely to participate [30,45-47,71] • <i>Caregiver status not easily verifiable through electronic health record</i>, disrupting eligibility screening [38] • Health care <i>professionals had doubts about the ability of patients</i> to complete electronic assessments [42] • Some patients barely wearing or averse to wearing the study device [38,43] • <i>Dyad studies require informed consent from patient and caregiver</i>, leading to logistical challenges [38] • Difficulties <i>remembering experiences with using the system</i> after the study period [31]

Themes	Facilitators	Barriers
Factors related to the method	<ul style="list-style-type: none"> • <i>Use of single items for constructs</i> to shorten questionnaire [39,48,58,69] reduces burden, improves adherence [39], and gives room for measurement of multiple constructs, possibly reducing reactivity to a single construct [69] • <i>Tailoring of sampling schedule to population of interest</i>, for example, limiting the frequency of assessments, to not overburden [67] or providing a broad enough window to respond in [53], possibly prompting the participant a second time if unanswered [55] • <i>Reminders or prompts</i>, including the option to tailor reminder schedules and contact by the researcher, might improve adherence [21,31,36,54,57,58,61] • Ability to use patients' <i>personal smartphones</i> [34,57], making the need for study visits to receive a specialized electronic study device obsolete [27,34,56] and providing a nonburdensome means to study individuals in their natural environment [27,34] • <i>Possibility to combine EMA^a prompting with passive monitoring</i> through high-grade commercially available devices [43,57] • <i>Using electronic devices over paper-and-pencil alternatives</i> does not impact attrition [32] • <i>Portability of mobile phones</i> enables daily assessments [60], while smartwatches can enhance acceptability [38] • <i>Facial emotions scale</i> demands less cognitive effort, is less of a burden, and makes responding more enjoyable [60] • <i>"Unsure" response option</i> can improve data quality when patients are confused with a question [38] • <i>Simple questionnaire and system design</i> for an easier patient experience [29,31,42] • Option to report <i>additional information</i> after structured questionnaire for a better patient experience (eg, additional symptoms and having preexisting conditions) [31] • <i>More time explaining how to respond</i> correctly to SMS response system can improve the quality of responding when the response format is expected to be difficult [37] • <i>Standardized protocol checklist</i> for researchers to streamline deployment installation [38] • <i>Providing participants with handouts</i> before the study period, including frequently asked questions and contact information in case of difficulties in using system [25] • <i>Easy and fast access to PROMs^b and gathered data</i>, for example, by the integration of monitoring system into the electronic patient, likely leads more uptake in clinical settings [30,42,73] and makes IT support crucial [42] • <i>Cloud services system</i> improves the ability to securely off-load and store data in real time [38] • <i>Reducing time delays between consent and deployment</i> can mitigate attrition and accommodate the dynamic clinical status of patients [38] • <i>Iterative deployments</i> can improve setting up and removing the system [38] • <i>Personal support by research assistant</i> is appreciated by patients [42] and might improve adherence [44] 	<ul style="list-style-type: none"> • <i>Single item constructs bring psychometric limitations</i> [39] • <i>Empty battery or low battery life</i>, possibly leading to device memory loss and missing data [38,45,46,51] • <i>Turned off phones or patients not wearing smartwatches</i> leading to missing data [38,51] • <i>Transmission or pairing errors</i> [33,38,42,51] can lead to frustrations [38] • Bugs in code to <i>monitor smartwatches</i> [38] • <i>Incompatibility issues</i> possible between smartphones' display specifications and the used app [61] • <i>Synchronization problems</i> related to automatic Android updates leading to inconsistent timing of EMA prompts [38] • <i>Poor reception</i> at home, for example, in rural areas [31,33], could cause necessity to switch SIM providers [33] • <i>Monitoring requires time and manpower</i> in a context with high clinician time constraints [37,42,71], possibly leading to fewer calls after clinician alerts [26], or lack of using monitoring results by clinical staff and trial investigators [42,64] • <i>Dependency of the implementation on health care professionals</i>, who are difficult to motivate to break the status quo [42] • <i>Vast amount of data</i> can be burdensome to clinicians [60] • <i>False-positive clinician alerts</i> due to errors in responding and transmission problems [33,37] • <i>Self-care information</i> not always read by patients [71] • Compliance to <i>time-blocked random signals</i> may be affected by participants waking up late or going to bed early [46] • <i>Developing EMA schemes can be challenging</i> when taking participant burden into account [39] • <i>Content irrelevant to patient</i> could cause dissatisfaction [37]; clinical monitoring measures should be tailored to their needs [42] • <i>24-hour recall may not be appropriate</i> to measure all symptoms [41] • <i>Unclear instructions</i> on when to complete event-contingent assessment can cause confusion among participants [38] • <i>Technical changes are complex and require time</i> to test and implement, but are often underestimated by clinical team [38] • In comparative trials, <i>electronic diary might bias patients</i> toward better self-management due to increased awareness and daily requirement to enter data [64] • <i>Interruption of monitoring assessment</i> (eg, due to diagnostics or therapy) [42] • <i>Rapid clinical staff turnover</i> [42]
Other factors	<ul style="list-style-type: none"> • COVID-19 pandemic [38,42] 	— ^c

^aEMA: ecological momentary assessment.

^bPROM: patient-reported outcome measure.

^cNot applicable.

Some facilitating method-related factors included the ability to tailor sampling schedules to the population of interest [53,55,67] and the option to use reminders [21,31,36,54,57,58,61]. Some

barriers included technical issues such as empty batteries leading to memory loss and missing data [38,45,46,51] and false-positive clinician alerts due to faulty responding and transmission

problems [33,37]. All these factors were associated with improvements in participation and compliance rates, user-experience, patient burden, quality of responses, time requirements for researchers, and adoption in clinical settings [21,22,25-34,36-38,40,42-48,51,55-58,60,61,67,69,71].

Discussion

Principal Findings

Intensive longitudinal methods with daily electronic assessments have been used among people with breast or lung cancer at different disease stages. The methods involved 1-6 assessments per day to study a wide range of experiences in daily life, primarily physical and psychological symptoms. Some studies integrated supportive features within the longitudinal assessments. For most studies, compliance and attrition rates were acceptable, although many studies lacked complete methodological reporting. Few studies focused on patients in the advanced stage of disease. We identified the barriers and facilitators for using these methods, related to both the person with cancer and the method itself.

Our review highlights the promise of intensive longitudinal methods to provide unique insights into the daily lives of people living with cancer. Importantly, these methods generally seem feasible and acceptable among patients with breast or lung cancer, supported by positive patient and health care professional experiences, along with compliance and attrition rates indicating acceptable amounts of missing data. These findings were true for different methodological approaches, such as studies that assessed patients once or multiple times daily. Moreover, these methods demonstrate flexibility as they were used to address an array of objectives, such as exploring within-person symptom associations [55] or communication patterns in dyads [63].

Before widespread implementation of these intensive methods in oncology research and practice, several of our findings encourage further investigation into its feasibility and optimal study conditions. First of all, it is striking that response- and methodology-related reporting was often incomplete or reported in different ways (eg, compliance rates and amount of questionnaire items). Standardized reports of this information are critical to inform optimal methodological choices in future studies or clinical procedures, as poor choices can lead to additional patient burden and missing data. Due to the unstandardized reporting by many included studies, comparisons in response-related results between studies with different methodological features were not possible in this review. Yet, such comparisons are particularly important when using intensive sampling methods in populations who are already susceptible to increased disease-related burden. In addition, several identified factors need further exploration to enhance the implementation of intensive longitudinal methods with daily electronic assessments in research and practice, for example, participants' feelings of inexperience and discomfort with technology leading to a lower likelihood to participate in the study [30,45-47,71]. Finally, low participation rates of the included studies indicate participant recruitment to be difficult, and sample sizes were often small. This is a major barrier for research, as it could lead to sampling bias, for instance, through

self-selected sampling of people more confident or experienced in using electronic systems. Subsequently, this could limit the validity of study findings.

Our review identified understudied areas that prevent gaining a complete understanding of people with breast or lung cancer and their daily experiences. First, several populations of people with breast or lung cancer are currently underrepresented in intensive longitudinal method studies, which significantly limits the generalizability of findings for these populations, including findings on the feasibility of these methods. For instance, of the 41 studies, only 4 (10%) were conducted in people with lung cancer specifically, 6 (15%) studies were conducted in people with stage IV cancer specifically, 1 (2%) study was conducted in a low-income country, and only 1 (2%) study included 1 male participant with breast cancer. Second, although the study objectives varied widely, studies predominantly focused on the aspects of physical health, such as pain, or had rather clinical views on psychological constructs by focusing on depression and anxiety. Only one included study [62] covered experiences from spiritual or existential quality of life domains, which is remarkable because these experiences generally have increasing value at the end of life [5,6]. Furthermore, although ESMs offer the potential for linking patient experiences with concurrent contexts (eg, where the patient is and what they are doing) [12], these contextual aspects remain understudied among people with breast or lung cancer. A broader focus encompassing different domains and contexts is needed to gain a more comprehensive understanding of patients' quality of life and well-being, ultimately enabling the improvement of patient-centered care.

Implications for Practice and Research

On the basis of our findings, we provide several recommendations for practice and research. First, applying existing reporting guidelines for EMAs, such as those synthesized by Liao et al [80], can improve transparency and consistency in reporting for intensive longitudinal studies in oncology. Their checklist serves as a starting point to fulfill recommended reporting criteria, such as reporting the use of prompts and complete questionnaire information [81]. This will allow future researchers to accurately explore the effects of study features on response-related results.

Second, addressing implementation factors highlighted in this review can be achieved through simple solutions, such as providing clear instructions, training on the use of the methods, and emphasizing the importance of the study to increase patient motivation and confidence [25,28-31,37,56,60]. Moreover, extensive pretesting such as conducting a pilot study is essential to uncover any technical issues that may arise.

Third, it is essential to determine optimal conditions for using intensive longitudinal methods with daily electronic assessments in people with cancer, such as ideal sampling schemes for the feasible measurement of specific constructs [82,83]. Studies should focus on populations at an increased risk for symptom burden, such as those with advanced stage cancer [84,85]. Furthermore, the use of supportive features such as automated feedback and clinician alerts needs more investigation to explore how it is optimally implemented in routine clinical practice for

the best possible outcomes. Moreover, it is recommended to develop measures to examine the quality of responses provided by patients [86], as these could be influenced by cancer and its treatment (eg, through cognitive impairment).

Fourth, future studies among patients with breast and lung cancers could broaden their focus to encompass more nonclinical psychological or spiritual-existential topics and contextual factors. This approach could yield novel insights into the interplay between physical functioning and other aspects of well-being and how they vary in different contexts [8]. Researchers could look to other populations of people living with or beyond cancer to further inform on the possibilities of these methods. For example, studies involving survivors of cancer could have a less clinical focus due to living past the treatment stage. Future literature reviews of the use of daily methods among such populations would be greatly beneficial.

Finally, studies should further explore how multiple daily measurements compare with the same constructs as measured by the more commonly used patient-reported outcome measures in oncology, in which patients are expected to aggregate experiences over ≥ 1 weeks [87,88]. Such research could examine the ecological validity of these commonly used patient-reported outcome measures [59] and provide valuable insights for oncology research and practice regarding which experiences are more accurately measured on a more frequent basis.

Strengths and Limitations

This scoping review followed a broad systematic search strategy in multiple databases, incorporating studies that used self-report

methods to assess patients daily or multiple times a day. Consequently, it offers a comprehensive overview of the methods used to gain insight into the daily experiences of people with breast and lung cancers at various stages across different countries.

Nevertheless, this review has limitations. First, it is plausible that we missed studies that used different terms for their daily electronic self-report questionnaire than those used in our search string. However, the broadness of our search string minimized this risk, and we detected articles that reported on methods that could be classified as ESMs but were not identified by the previous review in 2019 [12]. Second, only 10% of data extraction was checked by a second reviewer, and none were compared during the updated search, introducing a slight possibility of inaccuracies. We consider this a minor risk, as we found no disagreements in the 10% data that we had checked.

Conclusions

Intensive longitudinal methods using daily electronic assessments hold promise and can be feasible to provide unique insights into the daily lives of patients with breast or lung cancer. However, our findings encourage further research on the feasibility of determining optimal conditions for intensive monitoring, specifically in more advanced disease stages, and better adherence to standardized reporting guidelines. Moreover, considering a more multidimensional approach to the topics studied, especially beyond physical and psychopathological symptoms, will enhance the value of these methods, ultimately aiding in the improvement of patient-centered care in oncology.

Acknowledgments

The authors would like to thank Lise Rosquin for her valuable comments on the manuscript. This work is part of a wider study funded by the Research Foundation-Flanders (FWO), under grant agreement (G0C8120N). LP is a senior postdoctoral fellow of the Research Foundation-Flanders. LVdB holds the Collen-Francqui Research Professor Chair “Aging, dementia and palliative care” (2020-2023).

Authors' Contributions

All authors contributed to the conception and design of the study. JG and KdN acquired and interpreted the data. JG drafted the manuscript. All authors reviewed the final draft and provided the final approval.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Search terms.

[\[DOC File , 15 KB-Multimedia Appendix 1\]](#)

Multimedia Appendix 2

Study and sample characteristics.

[\[DOCX File , 33 KB-Multimedia Appendix 2\]](#)

Multimedia Appendix 3

Content and design characteristics.

[\[DOCX File , 37 KB-Multimedia Appendix 3\]](#)

Multimedia Appendix 4

Response-related characteristics.

[\[DOCX File, 22 KB-Multimedia Appendix 4\]](#)

Multimedia Appendix 5

PRISMA Scoping Review Checklist.

[\[PDF File \(Adobe PDF File\), 498 KB-Multimedia Appendix 5\]](#)

References

1. Ferlay J, Colombet M, Soerjomataram I, Parkin DM, Piñeros M, Znaor A, et al. Cancer statistics for the year 2020: an overview. *Int J Cancer*. Apr 05, 2021. [\[FREE Full text\]](#) [doi: [10.1002/ijc.33588](https://doi.org/10.1002/ijc.33588)] [Medline: [33818764](https://pubmed.ncbi.nlm.nih.gov/33818764/)]
2. Lam S, William L, Poon P. Acute cancer pain syndromes in palliative care emergencies. In: MacLeod R, van den Block L, editors. *Textbook of Palliative Care*. Cham, Switzerland. Springer International Publishing; 2018.
3. Henson LA, Maddocks M, Evans C, Davidson M, Hicks S, Higginson IJ. Palliative care and the management of common distressing symptoms in advanced cancer: pain, breathlessness, nausea and vomiting, and fatigue. *J Clin Oncol*. Mar 20, 2020;38(9):905-914. [\[FREE Full text\]](#) [doi: [10.1200/jco.19.00470](https://doi.org/10.1200/jco.19.00470)]
4. Caruso R, Nanni MG, Riba MB, Sabato S, Grassi L. The burden of psychosocial morbidity related to cancer: patient and family issues. *Int Rev Psychiatry*. Oct 2017;29(5):389-402. [\[FREE Full text\]](#) [doi: [10.1080/09540261.2017.1288090](https://doi.org/10.1080/09540261.2017.1288090)] [Medline: [28753076](https://pubmed.ncbi.nlm.nih.gov/28753076/)]
5. Selman LE, Brighton LJ, Sinclair S, Karvinen I, Egan R, Speck P, et al. Patients' and caregivers' needs, experiences, preferences and research priorities in spiritual care: a focus group study across nine countries. *Palliat Med*. Jan 12, 2018;32(1):216-230. [\[FREE Full text\]](#) [doi: [10.1177/0269216317734954](https://doi.org/10.1177/0269216317734954)] [Medline: [29020846](https://pubmed.ncbi.nlm.nih.gov/29020846/)]
6. Cohen SR, Mount BM, Tomas JJ, Mount LF. Existential well-being is an important determinant of quality of life: evidence from the McGill quality of life questionnaire. *Cancer*. Feb 1, 1996;77(3):576-586. [\[FREE Full text\]](#) [doi: [10.1002/\(SICD\)1097-0142\(19960201\)77:3<576::AID-CNCR22>3.0.CO;2-0](https://doi.org/10.1002/(SICD)1097-0142(19960201)77:3<576::AID-CNCR22>3.0.CO;2-0)]
7. Bos FM, Schoevers RA, aan het Rot M. Experience sampling and ecological momentary assessment studies in psychopharmacology: a systematic review. *Eur Neuropsychopharmacol*. Nov 2015;25(11):1853-1864. [\[FREE Full text\]](#) [doi: [10.1016/j.euroneuro.2015.08.008](https://doi.org/10.1016/j.euroneuro.2015.08.008)] [Medline: [26336868](https://pubmed.ncbi.nlm.nih.gov/26336868/)]
8. van Knippenberg RJ, de Vugt ME, Ponds RW, Myin-Germeys I, van Twillert B, Verhey FR. Dealing with daily challenges in dementia (deal-id study): an experience sampling study to assess caregiver functioning in the flow of daily life. *Int J Geriatr Psychiatry*. Sep 2017;32(9):949-958. [\[FREE Full text\]](#) [doi: [10.1002/gps.4552](https://doi.org/10.1002/gps.4552)] [Medline: [27464472](https://pubmed.ncbi.nlm.nih.gov/27464472/)]
9. Bolger N, Laurenceau JP. *Intensive Longitudinal Methods: An Introduction to Diary and Experience Sampling Research*. New York, NY. Guilford Press; 2013.
10. Aiello EJ, Taplin S, Reid R, Hobbs M, Seger D, Kamel H, et al. In a randomized controlled trial, patients preferred electronic data collection of breast cancer risk-factor information in a mammography setting. *J Clin Epidemiol*. Jan 2006;59(1):77-81. [\[FREE Full text\]](#) [doi: [10.1016/j.jclinepi.2005.07.007](https://doi.org/10.1016/j.jclinepi.2005.07.007)] [Medline: [16360564](https://pubmed.ncbi.nlm.nih.gov/16360564/)]
11. Stone AA, Shiffman S, Schwartz JE, Broderick JE, Hufford MR. Patient compliance with paper and electronic diaries. *Control Clin Trial*. Apr 2003;24(2):182-199. [\[FREE Full text\]](#) [doi: [10.1016/S0197-2456\(02\)00320-3](https://doi.org/10.1016/S0197-2456(02)00320-3)]
12. Kampshoff CS, Verdonck-de Leeuw IM, van Oijen MG, Sprangers MA, Buffart LM. Ecological momentary assessments among patients with cancer: a scoping review. *Eur J Cancer Care (Engl)*. May 14, 2019;28(3):e13095. [\[FREE Full text\]](#) [doi: [10.1111/ecc.13095](https://doi.org/10.1111/ecc.13095)] [Medline: [31090160](https://pubmed.ncbi.nlm.nih.gov/31090160/)]
13. Jim HS, Hoogland AI, Brownstein NC, Barata A, Dicker AP, Knoop H, et al. Innovations in research and clinical care using patient-generated health data. *CA Cancer J Clin*. May 2020;70(3):182-199. [\[FREE Full text\]](#) [doi: [10.3322/caac.21608](https://doi.org/10.3322/caac.21608)] [Medline: [32311776](https://pubmed.ncbi.nlm.nih.gov/32311776/)]
14. Paterson C, Armitage L, Turner M. Current landscape of ecological momentary assessment (real-time data) methodology in cancer research: a systematic review. *Semin Oncol Nurs*. Dec 2023;39(6):151514. [\[FREE Full text\]](#) [doi: [10.1016/j.soncn.2023.151514](https://doi.org/10.1016/j.soncn.2023.151514)] [Medline: [37865555](https://pubmed.ncbi.nlm.nih.gov/37865555/)]
15. Geeraerts J, Pivodic L, De Nooijer K, Naert E, Crombez G, De Ridder M, et al. Investigating experiences of people with advanced breast or lung cancer in their natural context: protocol for an experience sampling study. *BMJ Open*. Feb 14, 2024;14(2):e075752. [\[FREE Full text\]](#) [doi: [10.1136/bmjopen-2023-075752](https://doi.org/10.1136/bmjopen-2023-075752)] [Medline: [38355197](https://pubmed.ncbi.nlm.nih.gov/38355197/)]
16. Munn Z, Peters MD, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol*. Nov 19, 2018;18(1):143. [\[FREE Full text\]](#) [doi: [10.1186/s12874-018-0611-x](https://doi.org/10.1186/s12874-018-0611-x)] [Medline: [30453902](https://pubmed.ncbi.nlm.nih.gov/30453902/)]
17. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. Feb 2005;8(1):19-32. [\[FREE Full text\]](#) [doi: [10.1080/1364557032000119616](https://doi.org/10.1080/1364557032000119616)]
18. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. Oct 02, 2018;169(7):467-473. [\[FREE Full text\]](#) [doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850)] [Medline: [30178033](https://pubmed.ncbi.nlm.nih.gov/30178033/)]

19. EndNote: Office 2013 compatibility. Clarivate. Jun 15, 2022. URL: https://support.clarivate.com/Endnote/s/article/EndNote-Office-20132016-Compatibility?language=en_US [accessed 2024-05-24]
20. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan-a web and mobile app for systematic reviews. *Syst Rev*. Dec 05, 2016;5(1):210. [FREE Full text] [doi: [10.1186/s13643-016-0384-4](https://doi.org/10.1186/s13643-016-0384-4)] [Medline: [27919275](https://pubmed.ncbi.nlm.nih.gov/27919275/)]
21. Çınar D, Karadakovan A, Erdoğan AP. Effect of mobile phone app-based training on the quality of life for women with breast cancer. *Eur J Oncol Nurs*. Jun 2021;52:101960. [FREE Full text] [doi: [10.1016/j.ejon.2021.101960](https://doi.org/10.1016/j.ejon.2021.101960)] [Medline: [33882446](https://pubmed.ncbi.nlm.nih.gov/33882446/)]
22. Aigner CJ, Cinciripini PM, Anderson KO, Baum GP, Gritz ER, Lam CY. The association of pain with smoking and quit attempts in an electronic diary study of cancer patients trying to quit. *Nicotine Tob Res*. Jun 2016;18(6):1449-1455. [FREE Full text] [doi: [10.1093/ntr/ntv118](https://doi.org/10.1093/ntr/ntv118)] [Medline: [26038362](https://pubmed.ncbi.nlm.nih.gov/26038362/)]
23. Chumbler NR, Mkanta WN, Richardson LC, Harris L, Darkins A, Kobb R, et al. Remote patient-provider communication and quality of life: empirical test of a dialogic model of cancer care. *J Telemed Telecare*. 2007;13(1):20-25. [FREE Full text] [doi: [10.1258/13576330779701112](https://doi.org/10.1258/13576330779701112)] [Medline: [17288654](https://pubmed.ncbi.nlm.nih.gov/17288654/)]
24. Harper FW, Heath EI, Gleason ME, Penner L, Lorusso P, Wang D, et al. Physicians' use of patients' daily reports of quality of life to evaluate treatment response in phase I cancer trials. *J Cancer Ther*. Oct 2012;3(5):582-588. [FREE Full text] [doi: [10.4236/jct.2012.35074](https://doi.org/10.4236/jct.2012.35074)] [Medline: [24058742](https://pubmed.ncbi.nlm.nih.gov/24058742/)]
25. Langer SL, Romano JM, Todd M, Strauman TJ, Keefe FJ, Syrjala KL, et al. Links between communication and relationship satisfaction among patients with cancer and their spouses: results of a fourteen-day smartphone-based ecological momentary assessment study. *Front Psychol*. 2018;9:1843. [FREE Full text] [doi: [10.3389/fpsyg.2018.01843](https://doi.org/10.3389/fpsyg.2018.01843)] [Medline: [30364167](https://pubmed.ncbi.nlm.nih.gov/30364167/)]
26. Mooney KH, Beck SL, Friedman RH, Farzanfar R, Wong B. Automated monitoring of symptoms during ambulatory chemotherapy and oncology providers' use of the information: a randomized controlled clinical trial. *Support Care Cancer*. Sep 2014;22(9):2343-2350. [FREE Full text] [doi: [10.1007/s00520-014-2216-1](https://doi.org/10.1007/s00520-014-2216-1)] [Medline: [24687538](https://pubmed.ncbi.nlm.nih.gov/24687538/)]
27. van den Berg L, Brouwer P, Panda N, Hoogbergen M, Solsky I, Onnela JP, et al. Feasibility and performance of smartphone-based daily micro-surveys among patients recovering from cancer surgery. *Qual Life Res*. Feb 2022;31(2):579-587. [FREE Full text] [doi: [10.1007/s11136-021-02934-x](https://doi.org/10.1007/s11136-021-02934-x)] [Medline: [34283380](https://pubmed.ncbi.nlm.nih.gov/34283380/)]
28. Kearney N, Kidd L, Miller M, Sage M, Khorrani J, McGee M, et al. Utilising handheld computers to monitor and support patients receiving chemotherapy: results of a UK-based feasibility study. *Support Care Cancer*. Jul 2006;14(7):742-752. [FREE Full text] [doi: [10.1007/s00520-005-0002-9](https://doi.org/10.1007/s00520-005-0002-9)] [Medline: [16525792](https://pubmed.ncbi.nlm.nih.gov/16525792/)]
29. Maguire R, Miller M, Sage M, Norrie J, McCann L, Taylor L, et al. Results of a UK based pilot study of a mobile phone based advanced symptom management system (ASyMS) in the remote monitoring of chemotherapy related toxicity. *Clin Eff Nurs*. Sep 2005;9(3-4):202-210. [FREE Full text] [doi: [10.1016/j.cein.2006.08.013](https://doi.org/10.1016/j.cein.2006.08.013)]
30. McCall K, Keen J, Farrer K, Maguire R, McCann L, Johnston B, et al. Perceptions of the use of a remote monitoring system in patients receiving palliative care at home. *Int J Palliat Nurs*. Sep 2008;14(9):426-431. [FREE Full text] [doi: [10.12968/ijpn.2008.14.9.31121](https://doi.org/10.12968/ijpn.2008.14.9.31121)] [Medline: [19060793](https://pubmed.ncbi.nlm.nih.gov/19060793/)]
31. McCann L, Maguire R, Miller M, Kearney N. Patients' perceptions and experiences of using a mobile phone-based advanced symptom management system (ASyMS) to monitor and manage chemotherapy related toxicity. *Eur J Cancer Care (Engl)*. Mar 2009;18(2):156-164. [FREE Full text] [doi: [10.1111/j.1365-2354.2008.00938.x](https://doi.org/10.1111/j.1365-2354.2008.00938.x)] [Medline: [19267731](https://pubmed.ncbi.nlm.nih.gov/19267731/)]
32. Kearney N, McCann L, Norrie J, Taylor L, Gray P, McGee-Lennon M, et al. Evaluation of a mobile phone-based, advanced symptom management system (ASyMS) in the management of chemotherapy-related toxicity. *Support Care Cancer*. Apr 2009;17(4):437-444. [FREE Full text] [doi: [10.1007/s00520-008-0515-0](https://doi.org/10.1007/s00520-008-0515-0)] [Medline: [18953579](https://pubmed.ncbi.nlm.nih.gov/18953579/)]
33. Weaver A, Love SB, Larsen M, Shanyinde M, Waters R, Grainger L, et al. A pilot study: dose adaptation of capecitabine using mobile phone toxicity monitoring - supporting patients in their homes. *Support Care Cancer*. Oct 2014;22(10):2677-2685. [FREE Full text] [doi: [10.1007/s00520-014-2224-1](https://doi.org/10.1007/s00520-014-2224-1)] [Medline: [24771299](https://pubmed.ncbi.nlm.nih.gov/24771299/)]
34. Besse KT, Faber-te Boveldt ND, Janssen GH, Vernooij-Dassen M, Vissers KC, Engels Y. Pain assessment with short message service and interactive voice response in outpatients with cancer and pain: a feasibility study. *Pain Pract*. Mar 2016;16(3):320-326. [FREE Full text] [doi: [10.1111/papr.12278](https://doi.org/10.1111/papr.12278)] [Medline: [25581306](https://pubmed.ncbi.nlm.nih.gov/25581306/)]
35. Hachizuka M, Yoshiuchi K, Yamamoto Y, Iwase S, Nakagawa K, Kawagoe K, et al. Development of a personal digital assistant (PDA) system to collect symptom information from home hospice patients. *J Palliat Med*. Jun 2010;13(6):647-651. [FREE Full text] [doi: [10.1089/jpm.2009.0350](https://doi.org/10.1089/jpm.2009.0350)] [Medline: [20509795](https://pubmed.ncbi.nlm.nih.gov/20509795/)]
36. Passardi A, Foca F, Caffo O, Tondini CA, Zambelli A, Vespignani R, et al. A remote monitoring system to optimize the home management of oral anticancer therapies (ONCO-TreC): prospective training-validation trial. *J Med Internet Res*. Jan 26, 2022;24(1):e27349. [FREE Full text] [doi: [10.2196/27349](https://doi.org/10.2196/27349)] [Medline: [35080505](https://pubmed.ncbi.nlm.nih.gov/35080505/)]
37. Yap KY, Low HX, Koh KS, Un M, Shih V, Chan A. Feasibility and acceptance of a pharmacist-run tele-oncology service for chemotherapy-induced nausea and vomiting in ambulatory cancer patients. *Telemed J E Health*. May 2013;19(5):387-395. [FREE Full text] [doi: [10.1089/tmj.2012.0136](https://doi.org/10.1089/tmj.2012.0136)] [Medline: [23531095](https://pubmed.ncbi.nlm.nih.gov/23531095/)]
38. LeBaron V, Alam R, Bennett R, Blackhall L, Gordon K, Hayes J, et al. Deploying the behavioral and environmental sensing and intervention for cancer smart health system to support patients and family caregivers in managing pain: feasibility and acceptability study. *JMIR Cancer*. Aug 09, 2022;8(3):e36879. [FREE Full text] [doi: [10.2196/36879](https://doi.org/10.2196/36879)] [Medline: [35943791](https://pubmed.ncbi.nlm.nih.gov/35943791/)]

39. LeBaron V, Homdee N, Ogunjirin E, Patel N, Blackhall L, Lach J. Describing and visualizing the patient and caregiver experience of cancer pain in the home context using ecological momentary assessments. *Digit Health*. 2023;9:20552076231194936. [FREE Full text] [doi: [10.1177/20552076231194936](https://doi.org/10.1177/20552076231194936)] [Medline: [37654707](https://pubmed.ncbi.nlm.nih.gov/37654707/)]
40. Coolbrandt A, Muylaert K, Vandeneede E, Dooms C, Wildiers H. Remote system for daily symptom monitoring during systemic anticancer treatment. *Cancer Nurs*. Aug 5, 2021;45(4):E758-E765. [FREE Full text] [doi: [10.1097/ncc.0000000000000999](https://doi.org/10.1097/ncc.0000000000000999)]
41. Lee MK, Basch E, Mitchell SA, Minasian LM, Langlais BT, Thanarajasingam G, et al. Reliability and validity of PRO-CTCAE® daily reporting with a 24-hour recall period. *Qual Life Res*. Jul 2023;32(7):2047-2058. [FREE Full text] [doi: [10.1007/s11136-023-03374-5](https://doi.org/10.1007/s11136-023-03374-5)] [Medline: [36897529](https://pubmed.ncbi.nlm.nih.gov/36897529/)]
42. Nordhausen T, Lampe K, Vordermark D, Holzner B, Al-Ali HK, Meyer G, et al. An implementation study of electronic assessment of patient-reported outcomes in inpatient radiation oncology. *J Patient Rep Outcomes*. Jul 19, 2022;6(1):77. [FREE Full text] [doi: [10.1186/s41687-022-00478-3](https://doi.org/10.1186/s41687-022-00478-3)] [Medline: [35852715](https://pubmed.ncbi.nlm.nih.gov/35852715/)]
43. Schuler T, King C, Matsveru T, Back M, Clark K, Chin D, et al. Wearable-triggered ecological momentary assessments are feasible in people with advanced cancer and their family caregivers: feasibility study from an outpatient palliative care clinic at a cancer center. *J Palliat Med*. Jul 2023;26(7):980-985. [FREE Full text] [doi: [10.1089/jpm.2022.0535](https://doi.org/10.1089/jpm.2022.0535)] [Medline: [37134212](https://pubmed.ncbi.nlm.nih.gov/37134212/)]
44. van Roozendaal AS, Schellekens MP, van Woezik RA, van der Lee ML. Exploring the dynamic interconnectedness of protective and perpetuating factors of cancer-related fatigue. *Psychooncology*. Dec 2023;32(12):1876-1884. [FREE Full text] [doi: [10.1002/pon.6235](https://doi.org/10.1002/pon.6235)] [Medline: [37902175](https://pubmed.ncbi.nlm.nih.gov/37902175/)]
45. Badr H, Laurenceau JP, Schart L, Basen-Engquist K, Turk D. The daily impact of pain from metastatic breast cancer on spousal relationships: a dyadic electronic diary study. *Pain*. Dec 2010;151(3):644-654. [FREE Full text] [doi: [10.1016/j.pain.2010.08.022](https://doi.org/10.1016/j.pain.2010.08.022)] [Medline: [20833474](https://pubmed.ncbi.nlm.nih.gov/20833474/)]
46. Badr H, Pasipanodya EC, Laurenceau JP. An electronic diary study of the effects of patient avoidance and partner social constraints on patient momentary affect in metastatic breast cancer. *Ann Behav Med*. Apr 2013;45(2):192-202. [FREE Full text] [doi: [10.1007/s12160-012-9436-8](https://doi.org/10.1007/s12160-012-9436-8)] [Medline: [23150234](https://pubmed.ncbi.nlm.nih.gov/23150234/)]
47. Stephenson E, DeLongis A, Bruel B, Badr H. Outpatient pain medication use: an electronic daily diary study in metastatic breast cancer. *J Pain Symptom Manage*. Apr 2018;55(4):1131-1137. [FREE Full text] [doi: [10.1016/j.jpainsymman.2017.11.032](https://doi.org/10.1016/j.jpainsymman.2017.11.032)] [Medline: [29221847](https://pubmed.ncbi.nlm.nih.gov/29221847/)]
48. Belcher AJ, Laurenceau JP, Graber EC, Cohen LH, Dasch KB, Siegel SD. Daily support in couples coping with early stage breast cancer: maintaining intimacy during adversity. *Health Psychol*. Nov 2011;30(6):665-673. [FREE Full text] [doi: [10.1037/a0024705](https://doi.org/10.1037/a0024705)] [Medline: [21823795](https://pubmed.ncbi.nlm.nih.gov/21823795/)]
49. Pasipanodya EC, Parrish BP, Laurenceau JP, Cohen LH, Siegel SD, Graber EC, et al. Social constraints on disclosure predict daily well-being in couples coping with early-stage breast cancer. *J Fam Psychol*. Aug 2012;26(4):661-667. [FREE Full text] [doi: [10.1037/a0028655](https://doi.org/10.1037/a0028655)] [Medline: [22686265](https://pubmed.ncbi.nlm.nih.gov/22686265/)]
50. Otto AK, Laurenceau JP, Siegel SD, Belcher AJ. Capitalizing on everyday positive events uniquely predicts daily intimacy and well-being in couples coping with breast cancer. *J Fam Psychol*. Feb 2015;29(1):69-79. [FREE Full text] [doi: [10.1037/fam0000042](https://doi.org/10.1037/fam0000042)] [Medline: [25528074](https://pubmed.ncbi.nlm.nih.gov/25528074/)]
51. Cai L, Boukhechba M, Gerber MS, Barnes LE, Showalter SL, Cohn WF, et al. An integrated framework for using mobile sensing to understand response to mobile interventions among breast cancer patients. *Smart Health*. Mar 2020;15:100086. [FREE Full text] [doi: [10.1016/j.smhl.2019.100086](https://doi.org/10.1016/j.smhl.2019.100086)]
52. Carson JW, Carson KM, Olsen M, Sanders L, Westbrook K, Keefe FJ, et al. Yoga practice predicts improvements in day-to-day pain in women with metastatic breast cancer. *J Pain Symptom Manage*. Jun 2021;61(6):1227-1233. [FREE Full text] [doi: [10.1016/j.jpainsymman.2020.10.009](https://doi.org/10.1016/j.jpainsymman.2020.10.009)] [Medline: [33065208](https://pubmed.ncbi.nlm.nih.gov/33065208/)]
53. Dasch KB, Cohen LH, Belcher A, Laurenceau JP, Kendall J, Siegel S, et al. Affective differentiation in breast cancer patients. *J Behav Med*. Dec 2010;33(6):441-453. [FREE Full text] [doi: [10.1007/s10865-010-9274-8](https://doi.org/10.1007/s10865-010-9274-8)] [Medline: [20585976](https://pubmed.ncbi.nlm.nih.gov/20585976/)]
54. Pinto BM, Kindred MD, Dunsiger SI, Williams DM. Sedentary behavior among breast cancer survivors: a longitudinal study using ecological momentary assessments. *J Cancer Surviv*. Aug 2021;15(4):546-553. [FREE Full text] [doi: [10.1007/s11764-020-00948-x](https://doi.org/10.1007/s11764-020-00948-x)] [Medline: [33029754](https://pubmed.ncbi.nlm.nih.gov/33029754/)]
55. Ratcliff CG, Lam CY, Arun B, Valero V, Cohen L. Ecological momentary assessment of sleep, symptoms, and mood during chemotherapy for breast cancer. *Psychooncology*. Nov 2014;23(11):1220-1228. [FREE Full text] [doi: [10.1002/pon.3525](https://doi.org/10.1002/pon.3525)] [Medline: [24706506](https://pubmed.ncbi.nlm.nih.gov/24706506/)]
56. Solk P, Gavin K, Fanning J, Welch W, Lloyd G, Cottrell A, et al. Feasibility and acceptability of intensive longitudinal data collection of activity and patient-reported outcomes during chemotherapy for breast cancer. *Qual Life Res*. Dec 2019;28(12):3333-3346. [FREE Full text] [doi: [10.1007/s11136-019-02278-7](https://doi.org/10.1007/s11136-019-02278-7)] [Medline: [31493269](https://pubmed.ncbi.nlm.nih.gov/31493269/)]
57. Phillips SM, Welch WA, Fanning J, Santa-Maria CA, Gavin KL, Auster-Gussman LA, et al. Daily physical activity and symptom reporting in breast cancer patients undergoing chemotherapy: an intensive longitudinal examination. *Cancer Epidemiol Biomarkers Prev*. Dec 2020;29(12):2608-2616. [FREE Full text] [doi: [10.1158/1055-9965.EPI-20-0659](https://doi.org/10.1158/1055-9965.EPI-20-0659)] [Medline: [32994340](https://pubmed.ncbi.nlm.nih.gov/32994340/)]

58. Auster-Gussman LA, Gavin KL, Siddique J, Welch WA, Solk P, Whitaker M, et al. Social cognitive variables and physical activity during chemotherapy for breast cancer: an intensive longitudinal examination. *Psychooncology*. Mar 2022;31(3):425-435. [FREE Full text] [doi: [10.1002/pon.5820](https://doi.org/10.1002/pon.5820)] [Medline: [34546611](https://pubmed.ncbi.nlm.nih.gov/34546611/)]
59. Stone AA, Broderick JE, Junghaenel DU, Schneider S, Schwartz JE. PROMIS fatigue, pain intensity, pain interference, pain behavior, physical function, depression, anxiety, and anger scales demonstrate ecological validity. *J Clin Epidemiol*. Jun 2016;74:194-206. [FREE Full text] [doi: [10.1016/j.jclinepi.2015.08.029](https://doi.org/10.1016/j.jclinepi.2015.08.029)] [Medline: [26628334](https://pubmed.ncbi.nlm.nih.gov/26628334/)]
60. Kim J, Lim S, Min YH, Shin YW, Lee B, Sohn G, et al. Depression screening using daily mental-health ratings from a smartphone application for breast cancer patients. *J Med Internet Res*. Aug 04, 2016;18(8):e216. [FREE Full text] [doi: [10.2196/jmir.5598](https://doi.org/10.2196/jmir.5598)] [Medline: [27492880](https://pubmed.ncbi.nlm.nih.gov/27492880/)]
61. Min YH, Lee JW, Shin YW, Jo MW, Sohn G, Lee JH, et al. Daily collection of self-reporting sleep disturbance data via a smartphone app in breast cancer patients receiving chemotherapy: a feasibility study. *J Med Internet Res*. May 23, 2014;16(5):e135. [FREE Full text] [doi: [10.2196/jmir.3421](https://doi.org/10.2196/jmir.3421)] [Medline: [24860070](https://pubmed.ncbi.nlm.nih.gov/24860070/)]
62. Sztachańska J, Krejtz I, Nežlek JB. Using a gratitude intervention to improve the lives of women with breast cancer: a daily diary study. *Front Psychol*. 2019;10:1365. [FREE Full text] [doi: [10.3389/fpsyg.2019.01365](https://doi.org/10.3389/fpsyg.2019.01365)] [Medline: [31249544](https://pubmed.ncbi.nlm.nih.gov/31249544/)]
63. Xu W, Wang J, Schoebi D. The role of daily couple communication in the relationship between illness representation and fear of cancer recurrence in breast cancer survivors and their spouses. *Psychooncology*. Jun 2019;28(6):1301-1307. [FREE Full text] [doi: [10.1002/pon.5082](https://doi.org/10.1002/pon.5082)] [Medline: [30946501](https://pubmed.ncbi.nlm.nih.gov/30946501/)]
64. Lim E, Boyle F, Okera M, Loi S, Goksu SS, van Hal G, et al. An open label, randomized phase 2 trial assessing the impact of food on the tolerability of abemaciclib in patients with advanced breast cancer. *Breast Cancer Res Treat*. Oct 2022;195(3):275-287. [FREE Full text] [doi: [10.1007/s10549-022-06690-5](https://doi.org/10.1007/s10549-022-06690-5)] [Medline: [35915198](https://pubmed.ncbi.nlm.nih.gov/35915198/)]
65. Welch WA, Solk P, Auster-Gussman L, Whitaker M, Siddique J, Fanning J, et al. Longitudinal sedentary time and symptoms in breast cancer patients during chemotherapy using ecological momentary assessment. *Med Sci Sports Exerc*. May 01, 2023;55(5):966-974. [doi: [10.1249/MSS.0000000000003115](https://doi.org/10.1249/MSS.0000000000003115)] [Medline: [36574735](https://pubmed.ncbi.nlm.nih.gov/36574735/)]
66. Whitaker M, Welch WA, Fanning J, Santa-Maria CA, Auster-Gussman LA, Solk P, et al. Using ecological momentary assessment to understand associations between daily physical activity and symptoms in breast cancer patients undergoing chemotherapy. *Support Care Cancer*. Aug 2022;30(8):6613-6622. [FREE Full text] [doi: [10.1007/s00520-022-07071-w](https://doi.org/10.1007/s00520-022-07071-w)] [Medline: [35488902](https://pubmed.ncbi.nlm.nih.gov/35488902/)]
67. Shiyko MP, Siembor B, Greene PB, Smyth J, Burkhalter JE. Intra-individual study of mindfulness: ecological momentary perspective in post-surgical lung cancer patients. *J Behav Med*. Feb 2019;42(1):102-110. [FREE Full text] [doi: [10.1007/s10865-018-9942-7](https://doi.org/10.1007/s10865-018-9942-7)] [Medline: [29992367](https://pubmed.ncbi.nlm.nih.gov/29992367/)]
68. Shiyko MP, Burkhalter J, Li R, Park BJ. Modeling nonlinear time-dependent treatment effects: an application of the generalized time-varying effect model (TVEM). *J Consult Clin Psychol*. Oct 2014;82(5):760-772. [FREE Full text] [doi: [10.1037/a0035267](https://doi.org/10.1037/a0035267)] [Medline: [24364799](https://pubmed.ncbi.nlm.nih.gov/24364799/)]
69. Steffen LE, Vowles KE, Smith BW, Gan GN, Edelman MJ. Daily diary study of hope, stigma, and functioning in lung cancer patients. *Health Psychol*. Mar 2018;37(3):218-227. [FREE Full text] [doi: [10.1037/hea0000570](https://doi.org/10.1037/hea0000570)] [Medline: [29172604](https://pubmed.ncbi.nlm.nih.gov/29172604/)]
70. Steffen LE, Cheavens JS, Vowles KE, Gabbard J, Nguyen H, Gan GN, et al. Hope-related goal cognitions and daily experiences of fatigue, pain, and functional concern among lung cancer patients. *Support Care Cancer*. Feb 2020;28(2):827-835. [FREE Full text] [doi: [10.1007/s00520-019-04878-y](https://doi.org/10.1007/s00520-019-04878-y)] [Medline: [31152302](https://pubmed.ncbi.nlm.nih.gov/31152302/)]
71. Maguire R, Ream E, Richardson A, Connaghan J, Johnston B, Kotronoulas G, et al. Development of a novel remote patient monitoring system: the advanced symptom management system for radiotherapy to improve the symptom experience of patients with lung cancer receiving radiotherapy. *Cancer Nurs*. 2015;38(2):E37-E47. [FREE Full text] [doi: [10.1097/NCC.000000000000150](https://doi.org/10.1097/NCC.000000000000150)] [Medline: [24836956](https://pubmed.ncbi.nlm.nih.gov/24836956/)]
72. Dunsmore VJ, Neupert SD. Coping with 'scanxiety': within-person processes in lung cancer. *Psychol Rep*. Mar 25, 2023;332941231164336. [FREE Full text] [doi: [10.1177/00332941231164336](https://doi.org/10.1177/00332941231164336)] [Medline: [36964680](https://pubmed.ncbi.nlm.nih.gov/36964680/)]
73. Coolbrandt A, Muylaert K, Vandeneede E, Dooms C, Wildiers H. Real-time symptom management in the context of a remote symptom-monitoring system: prospective process evaluation and cross-sectional survey to explore clinical relevance. *Support Care Cancer*. Jun 2021;29(6):3401-3408. [FREE Full text] [doi: [10.1007/s00520-021-06029-8](https://doi.org/10.1007/s00520-021-06029-8)] [Medline: [33515304](https://pubmed.ncbi.nlm.nih.gov/33515304/)]
74. Trotti A, Byhardt R, Stetz J, Gwede C, Corn B, Fu K, et al. Common toxicity criteria: version 2.0. an improved reference for grading the acute effects of cancer treatment: impact on radiotherapy. *Int J Radiat Oncol Biol Phys*. Apr 01, 2000;47(1):13-47. [FREE Full text] [doi: [10.1016/s0360-3016\(99\)00559-3](https://doi.org/10.1016/s0360-3016(99)00559-3)] [Medline: [10758303](https://pubmed.ncbi.nlm.nih.gov/10758303/)]
75. Fayers P, Bottomley A, EORTC Quality of Life Group, Quality of Life Unit. Quality of life research within the EORTC-the EORTC QLQ-C30. European Organisation for Research and Treatment of Cancer. *Eur J Cancer*. Mar 2002;38 Suppl 4:S125-S133. [FREE Full text] [doi: [10.1016/s0959-8049\(01\)00448-8](https://doi.org/10.1016/s0959-8049(01)00448-8)] [Medline: [11858978](https://pubmed.ncbi.nlm.nih.gov/11858978/)]
76. Watson D, Clark LA. The PANAS-X: manual for the positive and negative affect schedule - expanded form. The University of Iowa. 1994. URL: <https://iro.uiowa.edu/esploro/outputs/other/9983557488402771#file-0> [accessed 2024-05-25]
77. Kim J, Marcusson-Clavertz D, Yoshiuchi K, Smyth JM. Potential benefits of integrating ecological momentary assessment data into mHealth care systems. *Biopsychosoc Med*. 2019;13:19. [FREE Full text] [doi: [10.1186/s13030-019-0160-5](https://doi.org/10.1186/s13030-019-0160-5)] [Medline: [31413726](https://pubmed.ncbi.nlm.nih.gov/31413726/)]

78. Löwe B, Unützer J, Callahan CM, Perkins AJ, Kroenke K. Monitoring depression treatment outcomes with the Patient Health Questionnaire-9. *Med Care*. Dec 2004;42(12):1194-1201. [FREE Full text] [doi: [10.1097/00005650-200412000-00006](https://doi.org/10.1097/00005650-200412000-00006)] [Medline: [15550799](https://pubmed.ncbi.nlm.nih.gov/15550799/)]
79. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care*. Jun 1992;30(6):473-483. [Medline: [1593914](https://pubmed.ncbi.nlm.nih.gov/1593914/)]
80. Liao Y, Skelton K, Dunton G, Bruening M. A systematic review of methods and procedures used in ecological momentary assessments of diet and physical activity research in youth: an adapted STROBE Checklist for Reporting EMA Studies (CREMAS). *J Med Internet Res*. Jun 21, 2016;18(6):e151. [FREE Full text] [doi: [10.2196/jmir.4954](https://doi.org/10.2196/jmir.4954)] [Medline: [27328833](https://pubmed.ncbi.nlm.nih.gov/27328833/)]
81. Trull TJ, Ebner-Priemer UW. Ambulatory assessment in psychopathology research: a review of recommended reporting guidelines and current practices. *J Abnorm Psychol*. Jan 2020;129(1):56-63. [FREE Full text] [doi: [10.1037/abn0000473](https://doi.org/10.1037/abn0000473)] [Medline: [31868388](https://pubmed.ncbi.nlm.nih.gov/31868388/)]
82. Eisele G, Vachon H, Lafit G, Kuppens P, Houben M, Myin-Germeys I, et al. The effects of sampling frequency and questionnaire length on perceived burden, compliance, and careless responding in experience sampling data in a student population. *PsyArXiv Preprints*. Preprint posted online February 20, 2020. [FREE Full text] [doi: [10.31234/osf.io/zf4nm](https://doi.org/10.31234/osf.io/zf4nm)]
83. Shiffman S, Stone AA, Hufford MR. Ecological momentary assessment. *Annu Rev Clin Psychol*. 2008;4:1-32. [FREE Full text] [doi: [10.1146/annurev.clinpsy.3.022806.091415](https://doi.org/10.1146/annurev.clinpsy.3.022806.091415)] [Medline: [18509902](https://pubmed.ncbi.nlm.nih.gov/18509902/)]
84. Giesinger JM, Wintner LM, Oberguggenberger AS, Gamper EM, Fiegl M, Denz H, et al. Quality of life trajectory in patients with advanced cancer during the last year of life. *J Palliat Med*. Aug 2011;14(8):904-912. [FREE Full text] [doi: [10.1089/jpm.2011.0086](https://doi.org/10.1089/jpm.2011.0086)] [Medline: [21711125](https://pubmed.ncbi.nlm.nih.gov/21711125/)]
85. Hwang SS, Chang VT, Fairclough DL, Cogswell J, Kasimis B. Longitudinal quality of life in advanced cancer patients: pilot study results from a VA medical cancer center. *J Pain Symptom Manage*. Mar 2003;25(3):225-235. [FREE Full text] [doi: [10.1016/s0885-3924\(02\)00641-3](https://doi.org/10.1016/s0885-3924(02)00641-3)] [Medline: [12614957](https://pubmed.ncbi.nlm.nih.gov/12614957/)]
86. Geeraerts J, Kuppens P. Investigating careless responding detection techniques in experience sampling methods (ESM). *OSF*. URL: <https://osf.io/8ymh5/download> [accessed 2024-05-25]
87. van Roij J, Fransen H, van de Poll-Franse L, Zijlstra M, Raijmakers N. Measuring health-related quality of life in patients with advanced cancer: a systematic review of self-administered measurement instruments. *Qual Life Res*. Aug 2018;27(8):1937-1955. [FREE Full text] [doi: [10.1007/s11136-018-1809-4](https://doi.org/10.1007/s11136-018-1809-4)] [Medline: [29427216](https://pubmed.ncbi.nlm.nih.gov/29427216/)]
88. Miranda R, Raemdonck E, Deliëns L, Kaasa S, Zimmermann C, Rodin G, et al. Do cancer centres and palliative care wards routinely measure patients' quality of life? An international cross-sectional survey study. *Support Care Cancer*. Jul 31, 2023;31(8):499. [FREE Full text] [doi: [10.1007/s00520-023-07964-4](https://doi.org/10.1007/s00520-023-07964-4)] [Medline: [37523097](https://pubmed.ncbi.nlm.nih.gov/37523097/)]

Abbreviations

EMA: ecological momentary assessment

EORTC-QLQ-C30: EORTC Core Quality of Life Questionnaire

ESM: experience sampling methods

PRISMA-ScR: Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews

Edited by T de Azevedo Cardoso; submitted 23.06.23; peer-reviewed by C Ratcliff, M Schellekens, J Dekker; comments to author 17.01.24; revised version received 12.03.24; accepted 29.04.24; published 12.06.24

Please cite as:

Geeraerts J, de Nooijer K, Pivodic L, De Ridder M, Van den Block L

Intensive Longitudinal Methods Among Adults With Breast or Lung Cancer: Scoping Review

J Med Internet Res 2024;26:e50224

URL: <https://www.jmir.org/2024/1/e50224>

doi: [10.2196/50224](https://doi.org/10.2196/50224)

PMID: [38865186](https://pubmed.ncbi.nlm.nih.gov/38865186/)

©Joran Geeraerts, Kim de Nooijer, Lara Pivodic, Mark De Ridder, Lieve Van den Block. Originally published in the Journal of Medical Internet Research (<https://www.jmir.org>), 12.06.2024. This is an open-access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work, first published in the Journal of Medical Internet Research (ISSN 1438-8871), is properly cited. The complete bibliographic information, a link to the original publication on <https://www.jmir.org/>, as well as this copyright and license information must be included.