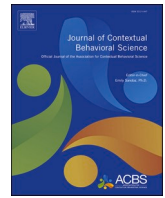




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# Engagement with mental health and health behavior change interventions: An integrative review of key concepts

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## ABSTRACT

Low intervention engagement is common in mental health and health behavior change interventions, but research on engagement is scattered, and heterogeneity in the definition and measurement of engagement is large. To aid future engagement research, we conducted an integrative review in which we 1) discuss definitions of engagement, 2) highlight four complementary models of engagement, and 3) propose an integrative conceptual model of engagement. We searched for definitions and models of engagement in in-person, digital, and blended mental health or health behavior change interventions. Forty studies provided definitions of engagement, which were discussed and categorized. We found that most models and definitions focused on behavioral dimensions of engagement, even though our synthesis of literature indicates that engagement is a complex multidimensional, and dynamic process that consists of behavioral, cognitive, and affective dimensions. Engagement is influenced by contextual factors, such as person- and intervention characteristics, and dynamic factors, such as a person's relationship with the care provider, and motivation for treatment. Levels of engagement vary throughout the intervention process, with intervention effects reciprocally reinforcing engagement through a positive feedback loop. To guide future research on engagement, we designed an integrative conceptual model of engagement, based on existing definitions and theories that considers the complexity of engagement and is applicable in multidisciplinary contexts. Future research ideally has a multidisciplinary and contextual focus and assesses the relationship between engagement and its related constructs.

## 1. Introduction

Mental health and health behavior change interventions are widely developed, implemented, and evaluated for their feasibility and effects. Low intervention engagement, for example through low intervention uptake and high drop-out, may lower the potential impact of interventions (Donkin et al., 2011; Eysenbach, 2005; Holdsworth et al., 2014; Sieverink et al., 2017; Swift et al., 2012; Yardley et al., 2016). Engagement is generally described as a complex, dynamic, and multidimensional construct, existing of behavioral, cognitive, and affective dimensions (Kelders et al., 2020; Nahum-Shani et al., 2022; Perski et al., 2017). Understanding – and subsequently targeting – key dimensions of intervention engagement is vital for improving intervention outcomes.

Multiple meta-analyses have assessed the association between

engagement and intervention outcomes. Gan et al. (2021) found that engagement was moderately associated with mental health outcomes regardless of study design, intervention type, or diagnosis. McLaughlin et al. (2021) included subjective metrics of engagement (i.e. attention, interest, and affect) alongside objective engagement metrics (i.e. number of logins, modules completed) and found a small, but significant association between engagement and physical activity. However, other meta-analyses show mixed results; Bisby et al. (2022) pooled the evidence on the relationship between engagement with online interventions targeting anxiety and intervention effect sizes using different engagement metrics. Only lower drop-out rates were associated with higher intervention effect sizes, while no association with other engagement modalities such as inclusion rate, intervention uptake, and module completion were found. In sum, there seems to be

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evidence of a positive relationship between engagement and intervention outcomes. However, the large heterogeneity in the conceptualization of engagement and engagement metrics limits comparability between studies. Additionally, methodological limitations such as differing study quality and the use of linear modeling enlarge the plausibility of bias (e.g. attrition bias), and therefore existing evidence should be interpreted with caution.

Besides heterogeneity in the conceptualization and measurement of engagement, there is also heterogeneity in engagement research itself. Research on engagement in different fields, contexts, and perspectives has led to new insights but left current knowledge relatively scattered. Some researchers broadly incorporated knowledge from educational-, occupational-, consumer-, health-, psychological-, and computer sciences (e.g. Kelders et al., 2020; Nahum-Shani et al., 2022; Perski et al., 2017). Others researched engagement in more specific settings, such as robotic-assisted interventions (Riches et al., 2021), interventions for insomnia (Uyumaz et al., 2021), or psychotic disorders (Bourke et al., 2021). There has also been a large interest in engagement with digital interventions (e.g. Borghouts et al., 2021; Fleming et al., 2018; Lipschitz et al., 2023; Nahum-Shani et al., 2022; Saleem et al., 2021; Yardley et al., 2016), in the predictors or other predecessors of engagement (e.g. Borghouts et al., 2021; Holdsworth et al., 2014; Liu & Gellatly, 2021; Muroff & Robinson, 2020; Uyumaz et al., 2021), and in its outcomes in terms of effects and real-life enactment (Bourke et al., 2021; Fleming et al., 2018; Gan et al., 2021; Hankonen, 2020; Holdsworth et al., 2014; Kaveladze et al., 2022).

Another issue in the existing literature is that engagement is usually operationalized as objective behavior (e.g. adherence, usage). Several authors have raised concern about this operationalization of engagement, and state that behavior alone does not do justice to the complex concept of engagement (Bijkerk et al., 2023; Holdsworth et al., 2014; Sieverink et al., 2017; Yardley et al., 2016). The large conceptual heterogeneity, scattered knowledge, and limited focus on cognitive and affective dimensions of engagement render existing evidence inconclusive regarding the question of what dimensions of engagement are most crucial to improving intervention outcomes. Therefore, there is a need to broaden our conceptual knowledge of engagement in a more specified context. A model of engagement, broadly integrating knowledge on different dimensions and contexts of engagement and drawing on research from the fields of clinical psychology and health psychology, would aid further research developments.

To work towards an integrative model, we review and integrate literature from the fields of clinical psychology (including all types of mental health interventions for sub-clinical mental health complaints, common mental health disorders, and serious mental illnesses) and health psychology (focused on health behavior change interventions). These fields are closely linked but differ in terms of their target outcomes and approaches and are usually not considered together. In practice, however, mental health interventions increasingly take general health behavior (such as sleep, physical activity, and eating habits) into account, because physical well-being and mental well-being are largely intertwined and general health behaviors thus contribute to good mental health, and vice versa (Huber et al., 2011). Given the rise in digital and blended interventions alongside in-person interventions in both fields, we also integrate engagement research across these delivery modes that are usually considered separately.

The goal of this review is to arrive at an integrative model of engagement that aids future research. First, to provide a thorough understanding of engagement, we discuss the different ways in which engagement is defined throughout the literature. Second, to gain a more profound understanding of the role of engagement within the intervention process, we describe four complementary models that explain intervention engagement from different perspectives. Third, to aid future research, we integrate these different perspectives and propose an overarching conceptual model of engagement. Due to the multidisciplinary nature of this review and to avoid stigmatization, we chose to

use discipline-neutral terms (e.g. *person* instead of *client*, and *care provider* instead of *therapist*) whenever possible.

## 2. Methods

### 2.1. Design

We conducted an integrative review of the key concepts of engagement with in-person, digital, or blended mental health and health behavior change interventions targeting adults. An integrative review is a narrative type of review in which key literature is synthesized and appraised to generate new conceptual and theoretical perspectives (Torraco, 2005; Whittemore & Knaf, 2005). This type of review allows for the integration of different types of literature and sources such as reports of empirical studies and descriptions of theories, which suits the multidisciplinary nature of this paper (Torraco, 2005; Whittemore & Knaf, 2005).

### 2.2. Search strategy

Literature was searched for articles presenting research of any design type (e.g. RCTs, cross-sectional, qualitative, review articles) on engagement with mental health and health behavior change interventions targeting adults. An initial literature research was conducted between September 2019 and December 2020, with an update in February 2022. Two different search methods were employed. In searching for engagement definitions, we consulted several databases (EBSCO, PubMed, PsycINFO, Web of Science, Scopus, and Google Scholar) to identify relevant literature published in and after the year 2000. These databases were selected based on their large coverage of journals. The keyword 'Engagement' was used, in combination with at least one of the keywords 'Intervention', 'eHealth', 'Behavior Change', 'Web-based', 'Face-to-face', 'Mental Health', 'Psychotherapy', and 'CBT'. Additional literature was found through cross-referencing.

Based on an initial title screening, 143 articles were identified for further screening (see Fig. 1 for screening flowchart). Articles were excluded if 1) the topic of research was not on engagement with mental health or health behavior change interventions, 2) articles described

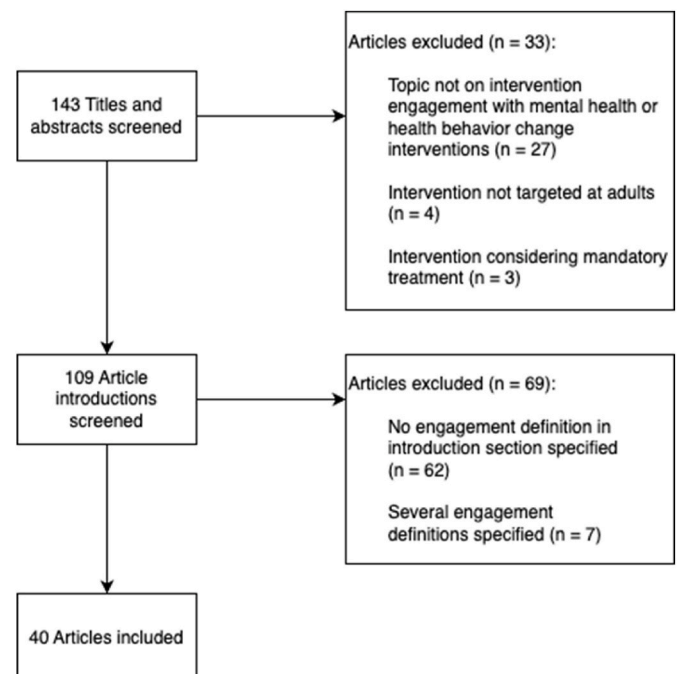


Fig. 1. Article selection flowchart.

interventions not targeting adults, or 3) articles considered forensic treatment (because of the mandatory nature of these treatments). After this initial selection, all introduction sections were screened for a definition of engagement. Articles were excluded when no definition of engagement was provided in the introduction section or when articles provided several definitions of engagement without specifying one working definition. This resulted in a literature sample of forty included papers. See Table 1 for an overview of the selected literature. We did not conduct a quality assessment, because data was extracted from the introduction section of articles. The eligibility screening was carried out by the first author.

During the screening and review of the literature sample, we identified four complementary models within our sample to be discussed in greater detail to offer a well-rounded understanding of relevant concepts of engagement from different perspectives (Drieschner et al., 2004; Holdsworth et al., 2014; Perski et al., 2017; Yardley et al., 2016). These four engagement models were purposefully selected from the literature sample. Each model adds unique value, and together they cover a wide array of relevant topics (i.e. motivation, therapeutic relationship, intervention factors) and approaches (linear vs. dynamic models). All are widely used and cited in engagement research in their fields of interest.

### 2.3. Literature analysis

The literature was analyzed following the methodological guidelines for integrative reviews by Whittemore and Knafl (2005) and approached from a pragmatic research paradigm. This means that we viewed engagement as an evolving construct and looked for different meanings of this construct across different fields and contexts.

First, the introductions of all articles were read, and the definitions of engagement were extracted. A definition was identified as a description of engagement provided by the authors, either cited from other literature or not. Then, definitions were categorized, based on the commonly used dimensions of behavioral-, cognitive-, and affective engagement (Kelders et al., 2020; Nahum-Shani et al., 2022). Definitions were considered behavioral when they referred to the actual performance of an activity (Nahum-Shani et al., 2022), cognitive when referring to a process of attention and information processing within the context of the intervention (Nahum-Shani et al., 2022), and affective when referring to emotional reactions towards an intervention (Nahum-Shani et al., 2022). Definitions could contain multiple dimensions of engagement. In those cases, the definition was categorized as one containing multiple dimensions of engagement, and the specific dimensions were categorized separately (see Table 1). An intervention's delivery mode was determined based on how the intervention's *integral active components* are delivered. Interventions in which the active components are delivered in a *simultaneous human-to-human interaction*, either physically or online, were considered 'in-person'. Interventions that deliver their active components solely through *automated technology* (e.g. applications, web apps, robotics, artificial intelligence) can be termed 'digital interventions'. Interventions that deliver their active components through both in-person and digital means were termed 'blended'. Second, we analyzed four complementary engagement models by reading the entire articles and extracting the core concepts, utilities, and considerations of these theoretical models. Finally, based on a critical analysis of the four models and the definitions of engagement encountered in the literature, we designed an integrative conceptual model of engagement that combines the different complementary dimensions of engagement across fields and delivery modes.

The first author searched and selected the literature, extracted the definitions of engagement, and proposed a first categorization of the engagement definitions. All four authors engaged in six bi-weekly group discussions during which the categorizations of engagement, emerging concepts, and models were discussed and iteratively reviewed. This iterative process resulted in the final categorization of engagement

definitions (see Table 1) and in the overarching conceptual model of engagement proposed in this review.

## 3. Results

This result section first describes and categorizes the forty definitions of engagement (see Table 1 for an overview of the included studies and definitions used). Second, the four models of engagement are discussed together with a critical analysis and synthesis, highlighting their commonalities and differences (see Table 2). And third, a conceptual model of engagement is proposed, based on the discussed models and definitions. Throughout this review, the term *intervention* is used as an umbrella term, and the type and delivery mode of the intervention is specified for each study.

### 3.1. Definitions of engagement in engagement research

#### 3.1.1. Behavioral engagement

In thirty-five studies, engagement is entirely or partly defined in terms of a specific behavior, for example number of sessions attended, time spent in an online module, homework compliance, or participation (Arnold et al., 2019; Bauermeister et al., 2017; Borghouts et al., 2021; Couper et al., 2010; Elkin et al., 2014; Fleming et al., 2018; Flynn et al., 2022; Gan et al., 2021; Glenn et al., 2013; Hack et al., 2020; Hall et al., 2001; Harris et al., 2021; Higgins et al., 2022; Holdsworth et al., 2014; Kaveladze et al., 2022; Mallonee et al., 2021; Matthews et al., 2018; McGonagle et al., 2021; Miller et al., 2019; Murray et al., 2019; Patel & Suhr, 2019; Perski et al., 2017; Pham et al., 2019; Richards & Simpson, 2015; Riches et al., 2021; Saleem et al., 2021; Saul et al., 2016; Strecher et al., 2008; Tetley et al., 2011; Torous et al., 2018; Walton et al., 2017; Yardley et al., 2016; Yeager et al., 2018; Zelencich et al., 2019). Especially in research on digital interventions, where the automatic recording of accurate usage data allows for in-depth analysis of intervention use, engagement is typically defined in behavioral terms. Usage can be further divided into more specific behaviors. For example, Perski et al. (2017) describe digital health behavior change intervention usage as a sub-dimension of engagement and specify usage as the amount (e.g., total intervention exposure), frequency (e.g., number of contacts), duration (e.g., length of sessions), and depth (e.g., variety of experienced intervention content) of intervention contact.

Behavioral engagement is also referred to as adherence. For example, Torous et al. (2018) and Gan et al. (2021) use an adherence-based definition of engagement and describe the *lack* of engagement in terms of poor uptake and adherence with mental health smartphone apps, but do not specify how a high degree of engagement is defined. McGonagle et al. (2021) describe engagement with mental health services as consisting of multiple behavioral dimensions, such as adherence to in-person mental health services, availability for appointments, collaborative responsibility in problem management, and help-seeking behavior.

Another definition often used to describe behavioral engagement is effort. Effort is usually described as active participation in a treatment or with an intervention and can be shown both within an intervention and outside of an intervention (Glenn et al., 2013; Hall et al., 2001; Higgins et al., 2022; Holdsworth et al., 2014; Mallonee et al., 2021; Tetley et al., 2011; Yardley et al., 2016). Inside-intervention effort shows through behaviors such as openly discussing relevant behaviors, emotions, and thought processes during an intervention session (Holdsworth et al., 2014; Mallonee et al., 2021; Murray et al., 2019; Yardley et al., 2016), or by sharing barriers to recovery (Hack et al., 2020). Outside-intervention effort or skills practice is shown by practicing behavior change outside of the intervention environment (Hall et al., 2001; Higgins et al., 2022; Holdsworth et al., 2014; Mallonee et al., 2021; Walton et al., 2017; Yardley et al., 2016), or by actively contemplating the topic of conversation for the next session (Richards & Simpson, 2015). The reciprocity of contact between someone and their care provider has also been

mentioned in the definitions of engagement (Riches et al., 2021), which implies that the care provider's behavior can be considered a part of engagement in some definitions.

Behavioral engagement is often measured using objective parameters, such as session logs and usage data (Bijkerk et al., 2023). The widespread availability of objective parameters makes objective usage data a convenient measure for the adherence aspects of engagement and helps to capture adherence as a clear-cut parameter of engagement (Bijkerk et al., 2023). However, the effort aspect of behavioral engagement is shown through a collection of more subtle behaviors (e.g. sharing progress, discussing emotions, real-life behavior change), and is more difficult to capture using objective data. Therefore, self-report measures or measures rated by the care provider, such as questionnaires, are more suitable and more often used for the effort aspect of behavioral engagement (Bijkerk et al., 2023).

### 3.1.2. Cognitive engagement

Fifteen studies mentioned cognitive dimensions as part of the definition of engagement (Aizenstros et al., 2021; Arnold et al., 2019; Borghouts et al., 2021; Flynn et al., 2022; Kaveladze et al., 2022; Lefebvre et al., 2010; Miller et al., 2019; Morrison et al., 2014; Perski et al., 2017; Saleem et al., 2021; Taki et al., 2017; Tzavela et al., 2018; Uyumaz et al., 2021; Walton et al., 2017; Zelencich et al., 2019). Three studies defined engagement as a purely cognitive construct (Aizenstros et al., 2021; Lefebvre et al., 2010; Tzavela et al., 2018).

Cognitive engagement is in some cases referred to as a process of motivation or involvement. For example, Lefebvre et al. (2010) and Arnold et al. (2019) define engagement with digital mental health interventions as a process of involvement that motivates someone toward achieving behavior change. Involvement is also mentioned as part of the definition of engagement, alongside behavioral and affective dimensions, where Flynn et al. (2022) link motivation and involvement to active participation and attendance. Uyumaz et al. (2021) describe engagement as a process of involvement together with affective dimensions of engagement stating that it is a combination of involvement and the quality of user experience. However, the way involvement is operationalized remains vague. It is unclear whether motivation can be considered a part of engagement or a related concept. Motivation is often seen by others as a predictor of engagement instead of an aspect of engagement (Drieschner et al., 2004; Holdsworth et al., 2014; Kelders et al., 2020).

Cognitive engagement is also described as a process of relating to an intervention. Tzavela et al. (2018) approach engagement with a CBT-based therapy for people diagnosed with panic disorders, and state that engagement is a process of active immersion (i.e., the feeling of progressing), trust in the method, and self-efficacy. Tzavela et al.'s (2018) definition resembles what has been described by others as personal relevance (Yardley et al., 2016). Yardley et al. (2016) describe personal relevance as meaning that someone identifies with the general treatment rationale (i.e. credibility) and sees the therapy as a way to reach their goals (i.e. expectancy). Similarly, Walton et al. (2017) include the level of understanding of the intervention in their definition of engagement. In a study on the effects of a digital intervention targeting behavioral activation for people suffering from anxiety- and depressive symptoms, Aizenstros et al. (2021) describe engagement as the subjective appraisal of task difficulty and obstacles to task completion, however, it remains unclear how this process takes place, and how it relates to engagement within the intervention setting. We deviate from Nahum-Shani et al. (2022) by categorizing identification under cognitive engagement instead of affective engagement. We do so because we view concepts such as identification, credibility, and

understanding to be predominantly cognitive processes, and not affective responses (e.g. someone can understand the rationale behind an intervention and agree with it while having a negative affective experience).

Perski et al. (2017) describe engagement as a multidimensional construct and see the cognitive dimension of engagement as a process of attention and interest toward an intervention. Miller et al. (2019), and Saleem et al. (2021) adopted the same definition of engagement, citing Perski et al. (2017) in their definition.

Cognitive engagement is a subjective dimension of engagement and is usually measured using questionnaire-based measures (either self-report or rated by the care provider), and qualitative measures; see (Bijkerk et al., 2023) for a discussion of measures for cognitive engagement.

### 3.1.3. Affective engagement

Nine studies used affective dimensions of engagement in their definition (Elkin et al., 2014; Kaveladze et al., 2022; Matthews et al., 2018; Miller et al., 2019; Morrison et al., 2014; Perski et al., 2017; Saleem et al., 2021; Taki et al., 2017; Uyumaz et al., 2021). Even though affective engagement can be distinguished as a separate dimension of engagement, we found no studies that describe engagement using affective dimensions only. Across the literature, definitions of affective engagement are usually combined with behavioral and/or cognitive dimensions of engagement.

Affective engagement is a subjective dimension of engagement and refers to someone's emotional experience with an intervention (Perski et al., 2017) or the quality of the intervention experience (Morrison et al., 2014; Uyumaz et al., 2021). Definitions mentioning affective dimensions of engagement are mainly used in the literature on digital interventions. Literature on interventions delivered in-person usually considers affect as an outcome of engagement, referring to it as intervention satisfaction (e.g. Holdsworth et al., 2014).

Another perspective on affective engagement comes from Matthews et al. (2018), who view engagement with digital mental health interventions as the relationship between a person and an intervention, akin to the relationship with a care provider in in-person intervention literature. Elkin et al. (2014) also mention the relationship with the care provider in their definition of engagement and define engagement as someone's perception of and contribution to the relationship with their care provider. Similarly to motivation, there is debate whether this type of relationship is part of engagement or a predictor of engagement. For example, Holdsworth et al. (2014) see the relationship someone has with their care provider as a predictor of engagement. However, in a digital context, there is often little to no simultaneous contact with a care provider, and the intervention itself provides the active components for the relationship, which is of a very different kind. Additionally, there's a greater emphasis on cognitive and affective dimensions in literature on digital interventions, with definitions mentioning terms like "look-and-feel", "immersion" and "aesthetic appeal" (i.e. Morrison et al., 2014).

Taken together, affective engagement is a highly subjective dimension of engagement and is sometimes referred to as one of the predictors or outcomes of engagement instead of engagement itself (Drieschner et al., 2004; Holdsworth et al., 2014; Kelders et al., 2020). Like cognitive engagement, affective engagement is often measured using self-report measures such as questionnaires or qualitative measures (Bijkerk et al., 2023). Self-report measures (rather than questionnaires rated by others) seem to be the most appropriate measurement tool, given that affective engagement stems from internal affective states (Bijkerk et al., 2023).



**Table 1**  
The definition of engagement across studies.

| Author                                     | Behavioral Engagement   |                 |                  |  |   |
|--|---|-----------------|------------------|--|---|
|  | Research aim  | Target outcome  | Targeted context | Sample and intervention type   | Definition of engagement  |
| <a href="#">Bauermeister et al. (2017)</a> | Review of the degree of engagement reporting with online HIV prevention or care interventions.  | Health behavior | Digital          | 6 studies reporting the development and testing of HIV prevention or care interventions.   | The frequency and amount of time spent in intervention.   |
| <a href="#">Couper et al. (2010)</a>       | Exploration of the quality of engagement with an online intervention promoting fruit and vegetable intake.  | Health behavior | Digital          | 2513 healthy participants.<br>Group 1: untailored web sessions<br>Group 2: tailored web sessions<br>Group 3: tailored web sessions with support  | Exposure to the program.  |
| <a href="#">Fleming et al. (2018)</a>      | Review of engagement with unguided digital interventions targeting low mood and anxiety complaints.   | Mental health   | Digital          | 11 studies reporting usage and implementation data on self-guided, online interventions for depression and/or anxiety complaints.  | Ongoing use, adherence, retention, or completion data.  |
| <a href="#">Gan et al. (2021)</a>          | Systematic review and meta-analysis on the effects of engagement with digital mental health interventions on mental health outcomes   | Mental health   | Digital          | 35 studies for narrative review, and 25 studies for meta-analysis that assessed the relationship between digital mental health interventions and intervention outcomes.  | [Non-engagement is defined as] suboptimal levels of user access and/or adherence to an intervention   |
| <a href="#">Glenn et al. (2013)</a>        | Exploration of treatment dose and engagement as predictors of treatment outcomes in a CBT intervention for anxiety disorders.   | Mental health   | In-person        | 503 patients with panic disorder, generalized anxiety disorder, social anxiety disorder, and/or post-traumatic stress disorder chose to receive CBT, self-guided CBT, pharmacotherapy or a combination of pharmacotherapy and CBT. There was no pre-set intervention duration, since that was part of the measures of intervention engagement. | The extent to which clients actively participate in treatment.  |
| <a href="#">Hack et al. (2020)</a>         | Study assessing the relationship between experiences stigma, discrimination and treatment engagement in adults with serious mental illnesses.   | Mental health   | In-person        | Questionnaire data of 167 adults and their therapists receiving treatment at 5 different treatment facilities  | Active participation in the activities of mental health treatment such as expressing goals for treatment, completing therapy “homework” outside of sessions, and sharing barriers to recovery.  |
| <a href="#">Hall et al. (2001)</a>         | Development and psychometric properties of an observer-rated scale to assess engagement with mental health services   | Mental health   | In-person        | Thirteen mental health professionals and forty-four mental health professional-client dyads were included in the development and testing the questionnaire.  | Engagement appears to involve not only appointment keeping, but also that which occurs within and between these appointments.   |
| <a href="#">Harris et al. (2021)</a>       | Qualitative study of non-engagement with group mental health intervention on acute mental health wards  | Mental health   | In-person        | Thematic analysis of semi-structured interviews and focus groups with 16 in-patient participants from two separate mental health wards.  | Uptake and dropout  |
| <a href="#">Higgins et al. (2022)</a>      | Qualitative study of individual interviews and focus groups with key stakeholders that assessed influential factors for engagement with group psycho-education programs   | Mental health   | In-person        | 75 stakeholders (16 program coordinators, 12 clinical facilitators, 25 peer facilitators, 16 program attendees, 6 other stakeholders) were included in the study.  | [Engagement] is not just about enrolling, recording attendance and attrition, but rather is a dynamic, co-constructed process that moves along a continuum from recruitment, active participation, to sustained engagement for duration of the programme. |
| <a href="#">Holdsworth et al. (2014)</a>   | Review of definition and assessment of engagement and client-, therapist-, and treatment factors associated with engagement with mental health interventions.   | Mental health   | In-person        | 79 studies that include an operational or assessment of client engagement, and assessed the association between engagement and client-, therapist-, or treatment factors.  | All the efforts that clients make during the course of treatment (both within and between sessions) toward the achievement of changes (treatment outcomes).   |
| <a href="#">Mallonee et al. (2021)</a>     | Cross-sectional exploratory study assessing to what degree the clients' perception of therapeutic alliance, therapist empathy, and coercion explain levels of engagement in outpatient clients with serious mental health conditions. | Mental health   | In-person        | Anonymous online survey completed by 131 participants experiencing a serious mental health condition.  | Attending sessions, completing treatment, engaging in between-session tasks, actively contributing to therapeutic work, and exhibiting behaviors and efforts to create positive change in one's life both within and beyond the therapeutic setting.      |
| <a href="#">McGonagle et al. (2021)</a>    | Systematic review assessing the association between adult attachment style and engagement in mental health services in patients suffering from psychosis.   | Mental health   | In-person        | Systematic review of 11 studies that included a sample of patients with psychosis, assessed attachment style and engagement.   | Clients' availability for appointments, collaborative responsibility for the management of difficulties, help-seeking and adherence to treatment.   |
| <a href="#">Murray et al. (2019)</a>       | Assessment of engagement and non-usage attrition of an online workplace implemented intervention aimed at raising physical activity.  | Health behavior | Digital          | 457 workers in various workplaces in Northern Ireland.   | The level of exposure to and use of an intervention and the amount of skills practice involved.   |
| <a href="#">Patel and Suhr (2019)</a>      | Investigation of the relationship between personality characteristics (measured   | Mental health   | In-person        | 135 people seeking outpatient psychological treatment.   | [Low engagement is] prematurely terminating therapy and percentage of   |

(continued on next page)

Table 1 (continued)

| Author                      | Behavioral Engagement  |                 |                  |  | Definition of engagement  |
|-----------------------------|--|-----------------|------------------|--|---|
|                             | Research aim   | Target outcome  | Targeted context | Sample and intervention type   |   |
| Pham et al. (2019)          | using the MMPI-2-RF) and treatment engagement\alliance. Review on analytical indicators of engagement with mHealth apps for chronic conditions.  | Health behavior | Digital          | 41 studies that described and studies consumer engagement with mobile apps, targeting self-management with chronic conditions.   | no-show appointments during a course of therapy. The amount, duration, breadth, and depth of intervention usage.  |
| Richards and Simpson (2015) | Exploration of the capacity of a technology-based add-on for a mental health intervention to enhance therapeutic alliance and treatment engagement.  | Mental health   | Blended          | Mixed method study of 7 patients following treatment in a university college mental health clinic. Weekly quantitative measures of mood, patient-rated therapeutic alliance, and therapist-rated treatment engagement. Qualitative measures entailed semi-structured interviews with patients. | Patients who are more engaged apply therapeutic learning more often, complete homework tasks more frequently, and spend some time considering dialogues to raise in their next therapy session. |
| Riches et al. (2021)        | Systematic review of the quality of therapeutic engagement in robot assisted therapeutical interventions   | Mental health   | Digital          | 30 studies that included robot assisted psycho-therapeutical interventions.  | The reciprocal interaction between a therapist and client   |
| Saul et al. (2016)          | Investigation of disengagement and attrition in participants that disengaged after using an intervention once.   | Health behavior | Digital          | 132 participants that previously used an online intervention targeting smoking cessation and did not return after initial use.   | 1) amount of exposure or use, and 2) skills practice, or the completion of activities or exercises that teach or reinforce knowledge or behavior related to the outcome of interest             |
| Strecher et al. (2008)      | A randomized controlled trial examining the predictive value of engagement on 6-months abstinence rates, sociodemographic predictors of engagement, and what components predicted engagement in a tailored web-based intervention targeting smoking cessation. | Health behavior | Digital          | 1866 smokers following a web-based intervention for smoking cessation in combination with nicotine replacement therapy were randomized into one of the 16 intervention arms.   | The number, duration, and pattern of visits to the site, and the number and types of pages viewed.  |
| Tetley et al. (2011)        | Review of the psychometric properties of measures for therapeutic engagement.  | Mental health   | In-person        | 47 articles describing a measure of engagement.  | The extent to which the client actively participates in the treatment on offer.   |
| Torous et al. (2018)        | Review on reasons for low engagement with mental health smartphone apps and clinical recommendations.  | Mental health   | Digital          | Narrative review of engagement literature and grey literature.   | 'Low engagement' [...] refers to a lack of uptake and/or poor adherence to an intervention among service users.   |
| Yardley et al. (2016)       | A review on 1) the conceptualization and operationalization of engagement with digital behavior change interventions, and 2) the dynamic relationship between intervention uses and behavior change.   | Health behavior | Digital          | Narrative review of engagement with digital behavior change interventions.   | A dynamic process that typically starts with a trigger, followed by initial use, which may be followed by sustained engagement, disengagement, or shifting to a different intervention.         |
| Yeager et al. (2018)        | Study examining patient engagement with a digital trauma intervention.   | Mental health   | Digital          | 440 patients with trauma symptoms that used a digital self-paced trauma intervention.  | How participants interact with the eHealth intervention, including how long and how often the intervention is used.   |
| Author                      | <b>Cognitive Engagement</b>  |                 |                  | <b>Research aim</b>  | <b>Research aim</b>   |
| Aizenstros et al. (2021)    | Study aimed to investigate the degree of engagement and effectivity between a behavior activation intervention for people with anxiety and depressive symptoms.  | Mental health   | Digital          | 208 participants who voluntarily downloaded the <i>MoodMission</i> app and provided consent to participate.  | The subjective appraisal of task difficulty and obstacles to task completion  |
| Lefebvre et al. (2010)      | Development and initial testing of an eHealth Engagement Scale.  | Mental health   | Digital          | N.A. (scale development)   | The process of involving users in health content in ways that motivate and lead to health behavior change.  |
| Tzavela et al. (2018)       | Qualitative study assessing the development, facilitators, and consequences of early-phase treatment engagement in patients following exposure-based cognitive-behavior therapy for panic disorders.   | Mental health   | In-person        | In-depth semi-structured interviews with 12 patients after their third therapeutic session. A grounded-theory approach was used.   | Attentively immersing in therapy, inspired by trusting the method and believing in oneself.   |
| Author                      | <b>Definitions containing multiple dimensions of engagement</b>  |                 |                  | <b>Sample and intervention type</b>  | <b>Definition of engagement</b>   |
| Arnold et al. (2019)        | Study aimed at investigating variables that predict treatment engagement in clients following an intervention for psychosis.   | Mental health   | Digital          | 89 participants using an online intervention targeting self-help and recovery in psychosis treatment were randomized to use the intervention autonomously or with additional email support for a period of 12 weeks.   | A user's involvement ( <b>cognitive</b> ) and interaction ( <b>behavioral</b> ) with an online intervention.  |

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Table 1 (continued)

| Author                                  | Behavioral Engagement   |                 |                  |   |  |
|---|---|-----------------|------------------|---|--|
|   | Research aim  | Target outcome  | Targeted context | Sample and intervention type  | Definition of engagement   |
| <a href="#">Borghouts et al. (2021)</a> | Systematic review of barriers and facilitators for engagement with digital mental health interventions                                  | Mental health   | Digital          | Systematic review of 208 empirical articles, including quantitative and qualitative research on engagement with digital interventions aimed to enhance mental health.   | A user's uptake ( <b>behavioral</b> ) and sustained interactions ( <b>behavioral</b> ) with a digital intervention, which includes interest in adopting an intervention ( <b>cognitive</b> ) as demonstrated by signing up for the digital intervention, initial uptake as demonstrated by engaging with features of the digital intervention as part of the study, at a minimum during a demonstration as part of the study and continued use of an intervention ( <b>behavioral</b> ). |
| <a href="#">Elkin et al. (2014)</a>     | Assessing the role of therapist responsiveness in early-treatment on therapeutic engagement   | Mental health   | In-person        | Assessment of videotapes and engagement data of 72 participants following CBT or interpersonal therapy (IPT) sessions for depression were assessed.   | Patient's positive perception of the relationship after the second session ( <b>affective</b> ), the patient's contribution to the therapeutic alliance during the third session ( <b>behavioral</b> ), and the patient's remaining in treatment for more than four sessions ( <b>behavioral</b> ).  |
| <a href="#">Flynn et al. (2022)</a>     | Scoping review on the impact of animal assisted interventions on client engagement in behavioral and mental health services.            | Mental health   | In-person        | Systematic review of 10 studies assessing engagement in animal assisted interventions in mental health services.  | A multifaceted construct that can refer to the client's motivation ( <b>cognitive</b> ), involvement ( <b>cognitive</b> ), active participation ( <b>behavioral</b> ), or attendance ( <b>behavioral</b> ) to the behavioral or mental health service that he or she is undergoing   |
| <a href="#">Kaveladze et al. (2022)</a> | Examination of the relationship between user experience, popularity and engagement with mental health apps                              | Mental health   | Digital          | Secondary data-analysis of 56 mental health apps.   | A multifaceted concept with <b>behavioral, cognitive, and affective</b> components.  |
| <a href="#">Matthews et al. (2018)</a>  | Investigation of engagement and patterns of engagement of clients using a self-help app for anxiety management.                         | Mental health   | Digital          | Analysis of anonymous usage data of 105,380 users of a self-help app for anxiety management   | The relationship between a consumer and an individual product or service ( <b>affective</b> ). [...] emotional ( <b>affective</b> ), usability ( <b>affective</b> ), and behavioral factors. Behavioral engagement can be defined in terms of users' interactions with different app functions and features, both quantitative and longitudinal ( <b>behavioral</b> ).   |
| <a href="#">Miller et al. (2019)</a>    | Viewpoint proposing a framework for collecting and analyzing engagement usage data.   | Mental health   | Digital          | N.A.  | Multidimensional concept, including the extent to which an intervention is used (e.g., amount, frequency, and duration) ( <b>behavioral</b> ) and the subjective experience of the user as characterized by attention ( <b>cognitive</b> ), affect ( <b>affective</b> ), and interest ( <b>cognitive</b> ).  |
| <a href="#">Morrison et al. (2014)</a>  | Exploration of client engagement with internet delivered self-help interventions for non-clinical bowel problems due to poor lifestyle. | Health behavior | Digital          | Mixed-method study assessing the experiences and engagement of 24 users of 3 intervention types: 1) general information, 2) self-assessment without tailored feedback, 3) self-assessment with tailored feedback. | Participants' affective responses ( <b>affective</b> ), the aesthetic appeal of the intervention ( <b>affective</b> ), and participants' perceptions of the interactivity and feedback provided by the intervention ( <b>cognitive</b> ).  |
| <a href="#">Perski et al. (2017)</a>    | Review of the conceptualization of engagement and proposal of an integrative framework explaining engagement and its related factors.   | Health behavior | Digital          | 117 studies on engagement with interventions.   | The extent of DBCI use (e.g., amount and depth of use) ( <b>behavioral</b> ) and a subjective experience with emotional and cognitive facets (i.e., attention ( <b>cognitive</b> ), interest ( <b>cognitive</b> ), and affect ( <b>affective</b> )).   |
| <a href="#">Saleem et al. (2021)</a>    | Scoping review of engagement strategies in digital mental health interventions.   | Mental health   | digital          | Review of 16 studies that assessed user engagement strategies in digital mental health interventions.   | (1) The extent (e.g. amount, frequency, duration, depth) of usage ( <b>behavioral</b> ) and (2) a subjective experience characterized by attention ( <b>cognitive</b> ), interest ( <b>cognitive</b> ), and affect ( <b>affective</b> ).   |
| <a href="#">Taki et al. (2017)</a>      | Development and testing of an engagement index in a real-life setting.  | Health behavior | Digital          | 300 mother-infant dyads using an app targeting infant obesity.  | The quality of the user experience ( <b>affective</b> ), the positive aspects of their interaction ( <b>affective</b> ), and their desire to use the app over longer periods of time or repeatedly ( <b>cognitive</b> ).   |
| <a href="#">Uyumaz et al. (2021)</a>    | Review of engagement of digital CBT apps for insomnia.  | Mental health   | Digital          | Review of engagement dimensions of six digital cognitive behavioral therapy apps for insomnia   | The degree of involvement ( <b>cognitive</b> ) or the quality of user experience with people, services, or tangible objects ( <b>affective</b> ).  |

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Table 1 (continued)

| Author                  | Behavioral Engagement   |                |                  | Sample and intervention type   | Definition of engagement  |
|-------------------------|---|----------------|------------------|--|---|
|                         | Research aim  | Target outcome | Targeted context |  |   |
| Walton et al. (2017)    | Review of measures of effectiveness and engagement with complex face-to-face interventions.   | Mental health  | In-person        | 66 studies that investigated complex face-to-face mental health intervention for adults and listed effectivity and/or engagement as one of the outcomes.     | Whether participants understand the intervention ( <b>cognitive</b> ), whether they can perform the skills required by the intervention ('intervention receipt') ( <b>behavioral</b> ), and whether they use these skills in daily life ('intervention enactment') ( <b>behavioral</b> ). |
| Zelencich et al. (2019) | Investigation of the association between demographics, symptom severity, and therapy process factors and homework engagement in CBT for traumatic brain injury. | Mental health  | In-person        | Analysis of 177 CBT sessions from 31 therapist-patient dyads of patients suffering from depressive and/or anxiety symptoms following traumatic brain injury. | How the client completed the homework (i.e., quality) ( <b>behavioral</b> ) and how the client perceived the homework (pre and post attempt/completion) ( <b>cognitive</b> ).   |

### 3.2. Models of engagement

In this section, we describe four complementary and widely cited models that explain intervention engagement from different perspectives (see Table 2 for an overview of core concepts per model). First, we describe the Integral Conceptualization of Treatment Motivation and Related Concepts (Drieschner et al., 2004). Second, we describe the Model of Client Engagement in Psychotherapy (Holdsworth et al., 2014). Third, we describe the Conceptual Framework of Engagement (Perski et al., 2017). And fourth we describe the model of Effective Engagement (Yardley et al., 2016).

#### 3.2.1. Integral conceptualization of treatment motivation and related concepts

Drieschner et al.'s (2004) model of Integral Conceptualization of Treatment Motivation and Related Concepts describes engagement with mental health interventions from an in-person context. In essence, the model postulates that intervention outcomes are influenced by a person's engagement with the intervention, which in turn is determined by their motivation. The model of Integral Conceptualization of Treatment Motivation and Related Concepts defines engagement as "the patients' behavioral engagement as required by the particular treatment approach" (Drieschner et al., 2004, p. 1130). The characteristics of someone's problem (e.g. severity of their symptoms) and the effectiveness of the intervention are assumed to moderate the relationship between engagement and intervention outcomes.

Motivation to engage with the intervention needs to be present before someone starts engaging (Drieschner et al., 2004). Internal and external predictors influence how motivated someone is to engage with an intervention. For example, external life events such as the death of a family member may have a negative influence on the formation of motivation, while internal predictors such as high outcome expectancies of the treatment may positively influence motivation (or vice versa). Higher levels of motivation are related to higher degrees of engagement, but factors outside of someone's volitional control can undermine motivation and thus prevent them from engaging. Examples are poor access to healthcare, societal norms surrounding therapy, or neuropsychological problems. Drieschner et al. (2004) highlight that the process of intervention motivation and engagement is dynamic at all stages. Even when someone engages with an intervention and desired outcomes start to emerge, circumstances can lead to disengagement. Likewise, initially low-engaging people can develop higher levels of intervention engagement.

The Integral Conceptualization of Treatment Motivation and Related Concepts (Drieschner et al., 2004) shows how internal- and external factors contribute to intervention motivation, engagement, and intervention outcomes. The authors define engagement as a behavioral construct, but use a circular definition, by defining engagement as "behavioral engagement as required by the particular treatment approach"

(Drieschner et al., 2004, p. 1130). By using the term behavioral engagement to define the construct of engagement, this conceptualization remains vague. Nevertheless, it can be categorized as an adherence-based definition due to the benchmark element it contains (i.e., actual engagement compared to the engagement required by the treatment approach).

#### 3.2.2. Client engagement in psychotherapy

The Model of Client Engagement in Psychotherapy (Holdsworth et al., 2014) focuses on engagement with mental health interventions in an in-person context. Holdsworth et al. (2014) explain how someone's relationship with their care provider and levels of motivation influence engagement, and how engagement influences intervention outcomes (see Table 2). The Model of Client Engagement in Psychotherapy (Holdsworth et al., 2014) describes engagement from a behavioral perspective. Behavioral engagement is subdivided into three aspects, thus going into more detail than Drieschner et al. (2004). The first aspect, attendance, refers to being present at the in-person intervention appointments and is described as the minimal effort required for engagement with an intervention. The second aspect, participation/involvement, refers to someone's effortful behavior within the intervention, for example by disclosing important information. The third aspect, homework, or practice refers to efforts that people make outside of the intervention.

Like the Integral Conceptualization of Treatment Motivation and Related Concepts (Drieschner et al., 2004), the Model of Client Engagement in Psychotherapy (Holdsworth et al., 2014) describes motivation as a predictor of engagement. Holdsworth et al. (2014) then add the person's relationship with their care provider to the model as a predictor of engagement. The relationship with the care provider refers to the way a person and a care provider work together and how they feel about working together and is assumed to play an important role in predicting engagement. In a good relationship, someone and the care provider agree on the goals of the treatment and on how to work towards these goals. Higher levels of motivation and positive perceptions of the care provider relationship are hypothesized to predict higher levels of engagement. Finally, engagement relates to intervention effectiveness and intervention satisfaction with higher levels of engagement leading to higher intervention effects and more positive ratings of the intervention during and after engagement (Holdsworth et al., 2014).

Like the Integral Conceptualization of Treatment Motivation and Related Concepts (Drieschner et al., 2004), the Client Engagement in Psychotherapy model (Holdsworth et al., 2014) conceptualizes engagement relatively narrowly, as they view engagement itself as only containing a behavioral dimension. Holdsworth et al. (2014) add more nuance to the different expressions of behavioral engagement by describing engagement as attendance plus effortful behavior, both within and outside of an intervention. The description of the relationship with the care provider as a predictor of engagement adds an



interesting cognitive and affective dimension to the engagement process, even though Holdsworth et al. (2014) do not view this cognitive-affective dimension as part of engagement. Similarly, and in line with their behavioral perspective on engagement, they view treatment satisfaction as an outcome rather than part of engagement.

### 3.2.3. Conceptual framework of engagement

The Conceptual Framework of Engagement (Perski et al., 2017) focuses on digital health behavior change interventions and is summarized in Table 2. Digital health behavior change interventions are accessible and flexible interventions specifically designed to target health behavior change (e.g., reducing unhealthy food intake or increasing exercise) through digital elements such as smartphone applications, text messages, or website content (Yardley et al., 2016).

In the Conceptual Framework of Engagement, Perski et al. (2017) describe engagement from a behavioral, cognitive, and affective perspective and specify the behavioral part of engagement in terms of the extent (amount, frequency, duration, and depth) of usage, the cognitive part as subjective attention and interest, and the affective part in terms of the affect about the intervention. This means that someone who is highly engaged uses the intervention as prescribed, pays attention, finds it interesting, and has a positive experience while doing so.

The Conceptual Framework of Engagement (Perski et al., 2017) proposes that engagement is influenced by the intervention and the context in which the intervention is delivered. For example, interventions delivered with an attractive design and personalized features elicit higher levels of engagement than dull and rigid interventions. The context of the interventions is seen as another predictor of engagement in the Conceptual Framework of Engagement and is divided into population factors and setting (Perski et al., 2017). Population factors refer to the personal context (e.g., age, gender, and self-efficacy), while setting refers to someone's social and financial context (e.g., physical access to health care, financial resources, and social norms surrounding mental health care; Perski et al., 2017). These two contextual factors can be compared to the internal- and external predictors of motivation to engage with treatment in Drieschner et al.'s (2004) model.

Perski et al. (2017) hypothesize that someone's context moderates how much they adhere to and their usage experience with the intervention. For example, engaging with an intervention might be more difficult for someone working full-time, compared to someone working fewer hours. This hypothesis of a moderating effect differs from the Integral Conceptualization of Treatment Motivation and Related Concepts (Drieschner et al., 2004) in which internal and external factors (i.e. context) were seen as predictors of engagement. However, Perski et al. (2017) note that future research on these indirect influences is still needed.

Although the previous two models (Drieschner et al., 2004; Holdsworth et al., 2014) acknowledged the dynamic nature of engagement, the Conceptual Framework of Engagement makes these dynamics explicit by introducing a positive feedback loop between engagement and intervention outcomes (i.e. target behavior; Perski et al., 2017). The term *positive* refers to both factors influencing each other in the same direction, and not whether the change is in the desired direction or not. This feedback loop starts with the notion that an intervention (e.g. anti-smoking app) influences target behavior (e.g. smoking) by altering certain mechanisms of action (e.g. coping skills for dealing with craving). Engagement moderates how effective an intervention is in altering these mechanisms of action, and consequently the degree of change in target behavior. The changes in target behavior feed back to engagement, by producing higher levels of engagement upon observation of desired changes in target behavior (i.e. being better able to cope with moments of craving), or lower levels of engagement when changes in target behavior are absent or disappointing (i.e. no change in smoking behavior, relapse). These decreased or increased levels of engagement then continue to moderate the intervention's effect on the mechanisms

of action, creating a positive feedback loop.

### 3.2.4. Effective engagement

Instead of conceptualizing engagement, its related dimensions, and consequences, Yardley et al. (2016) explain how engagement with a digital health behavior change intervention changes dynamically over time, and how different levels of engagement occur at different stages of intervention use (see Table 2). Yardley et al. (2016) distinguish engagement into micro- and macro-engagement. Micro-engagement is behavioral-based and refers to adherence to the intervention, for example by logging in and completing exercises. Macro-engagement contains a mix of behavioral and cognitive dimensions and refers to someone engaging with the goals of the digital health behavior change intervention, resulting in real-life behavior change and effort outside of the intervention. According to Yardley et al. (2016), engagement can be seen as a dynamic interplay between micro-engagement and macro-engagement. Phases of micro- and macro-engagement come in different patterns depending on the intervention, the person, and the phase of the engagement process.

During the first phase, someone starts to use an intervention, for example, due to a recommendation from a doctor. During this phase, people primarily show micro-engagement, as they get acquainted with the intervention and prepare for behavior change. This phase is in accordance with Perski et al.'s (2017) hypothesis that behavior change occurs after the intervention has sufficiently altered the mechanisms of action. After using the intervention for a while, someone then may start to change their behavior in real life while remaining in contact with the intervention for support and intervention content. In this phase, adherence to the intervention is assumed to mediate how much someone changes their behavior. After a period of interacting with the intervention and experimenting with new behavior, people may no longer depend on the help of the intervention in the behavior change process. In this phase, there is reduced intervention use, and people engage entirely with the goals of the intervention and show behavior change in real life (i.e., macro-engagement). The duration of this phase can vary largely since some people change their behavior as desired, and others might need to re-engage with the intervention for relapse management or additional support. The fourth phase shows this process of re-engagement with the intervention.

Yardley et al.'s (2016) model demonstrates how engagement can be shown through different types of behavior both within the intervention (micro-engagement) and outside of the intervention (macro-engagement). The behavioral part of this conceptualization can be considered an extension of the threefold conceptualization of behavioral engagement by Holdsworth et al. (2014). Attendance and inside-intervention effort are conceptually like micro-engagement, and outside-intervention effort are conceptually like the behavioral part of macro-engagement. Yardley et al. (2016) also illustrate how cognitive dimensions of engagement, such as identification with the intervention goals, are intertwined with outside-intervention engagement. Similarly, to the Conceptual Framework of Engagement (Perski et al., 2017), the Model of Effective Engagement (Yardley et al., 2016) postulates the dynamic nature of engagement but offers a different take on the dynamic interaction between engagement and intervention effects. Yardley et al. (2016) see micro-engagement as a mediator of the relationship between the intervention and behavior change, while Perski et al. (2017) assume that engagement moderates the effects of the intervention on changing the relevant mechanisms of action. Given the different ways both models operationalize engagement, this is understandable; Perski et al. (2017) approach engagement from a behavioral, cognitive and affective angle and see behavior change as an intervention outcome that is influenced by engagement. Yardley et al. (2016) on the other hand, include cognitive dimensions of engagement in their conceptualization of engagement and see outside-intervention engagement as a combination of engaging with the intervention goals (cognitive) and behavior change in real life (behavioral). This means that Yardley et al.

(2016) see behavior change not only as an intervention outcome but also as an inherent part of engagement itself. Yardley et al. (2016) then suggest that intervention adherence (micro-engagement) mediates how effective an intervention is in enacting behavior change (macro-engagement).

The proposed mediation between adherence and behavior change showcases an interesting view on engagement, in which intervention effects and engagement are seen as intertwined processes. Additionally, the added cognitive dimension (engaging with the intervention goals) captures a dimension of engagement that other models did not include. When approaching engagement from a behavioral perspective only, reduced intervention usage is usually seen as a sign of disengagement, whereas Yardley et al.'s (2016) inclusion of cognitive engagement dimensions allows reduced usage to be a natural part of the behavior change process.

### 3.3. Integrative conceptual model of engagement with mental health and health behavior change interventions

The previous sections demonstrate that engagement is a complex construct that has been described from different theoretical perspectives, using various definitions. In this section, we propose an integrated conceptual model that brings together the core similarities and differences between the fields and contexts we discussed. Our model describes the dimensions of engagement, its predictors, outcomes, and dynamic process (see Fig. 2).

#### 3.3.1. Dimensions of engagement

At the core of the model are the three dimensions of engagement, that are interrelated: behavioral-, cognitive-, and affective dimensions. Behavioral engagement is further specified as inside-intervention effort-adherence (degree of actual intervention usage versus the prescribed usage by the intervention) plus effortful behavior within the intervention) and outside-intervention effort (real-life skills-practice and behavior change). Cognitive engagement was defined as a subjective experience of attention and interest relating to the intervention in terms of credibility and expectancy. We defined affective engagement as the subjective positive, negative, or neutral emotional experiences with the intervention.

#### 3.3.2. Predicting variables

In our model, engagement is influenced by contextual predictors and

dynamic predictors. Contextual predictors are pre-existing circumstances occurring on the person-, and intervention-level, and are considered to be relatively stable over time (Drieschner et al., 2004; Perski et al., 2017). These contextual predictors impact the entire engagement process. Person-level contextual predictors are the internal factors (e.g. personality), external circumstances (e.g. financial resources), and societal influences (e.g. social norms surrounding psychological help someone experiences). Intervention-level contextual predictors consist of the intervention's content (e.g. the use of evidence-based components) and the method and quality of the intervention's delivery.

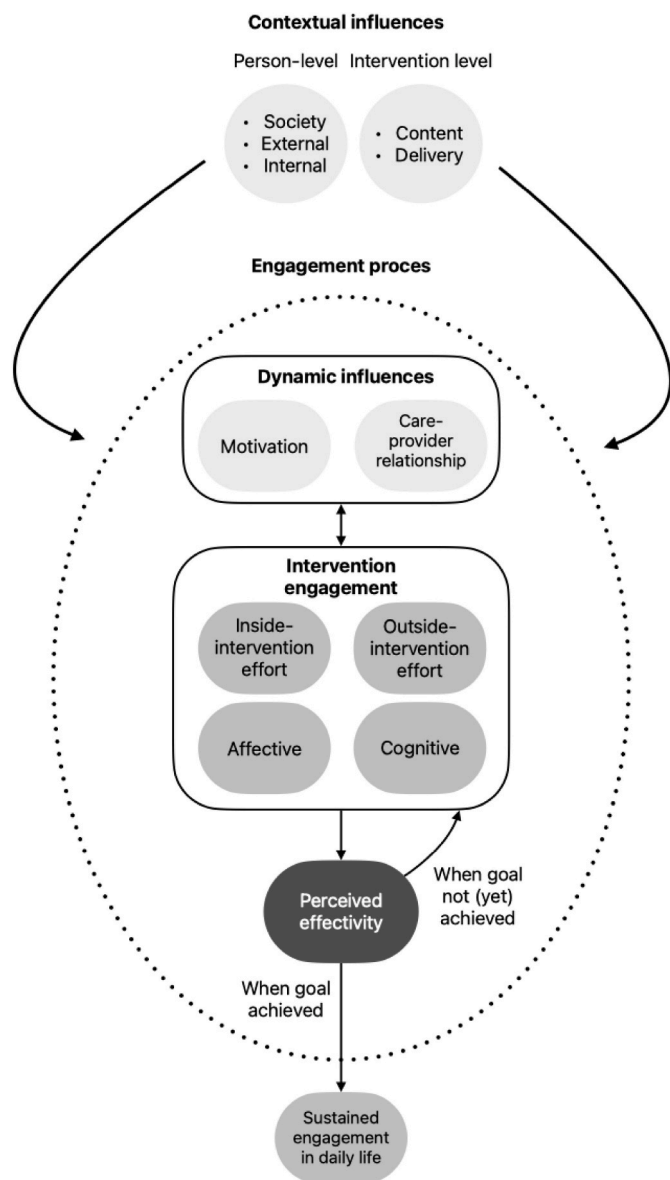
As discussed, the role of motivation and the care provider relationship in the engagement process is subject to much debate. We postulate that motivation and the relationship someone has with their care provider are dynamic predictors that both predict and are influenced by intervention engagement. Higher levels of motivation and/or a higher quality of the care provider relationship are expected to positively influence engagement across all dimensions (Drieschner et al., 2004; Holdsworth et al., 2014; Perski et al., 2017). We hypothesize that these higher levels of engagement, in turn, further promote higher levels of motivation/a better experience of the care provider relationship, and form a positive feedback loop similar to the positive feedback loop of perceived intervention effects and engagement proposed by Perski et al. (2017). The care provider relationship is a product of shared effort between someone and their care provider, meaning that the care provider, in the case of in-person interventions, plays a key role in the dynamic development of engagement. Lower levels of motivation and/or a poor care provider relationship would decrease levels of engagement across all dimensions, and vice versa.

#### 3.3.3. Dynamic impact of outcomes and sustained engagement

All engagement dimensions together impact the intervention's target outcomes (Drieschner et al., 2004; Holdsworth et al., 2014; Perski et al., 2017; Yardley et al., 2016). Someone's perception of these changes plays an important role in sustaining engagement through a positive feedback loop (Perski et al., 2017). The term *positive* in positive feedback loop refers to both factors influencing each other in the same direction and does not describe whether the change is in a desired direction. This positive feedback loop is assumed to stimulate all dimensions of engagement, including the experience with the intervention (affective engagement), the perception of the fittingness of the intervention and outcome expectancies (cognitive engagement), and levels of

**Table 2**  
Overview of engagement models, their context, predictors of engagement, definition of engagement, and engagement outcomes.

| Model Characteristic     | Model   |  |   |  |
|--------------------------|---|--|---|--|
|                          | Integral Conceptualization of Treatment Motivation and Related Concepts (Drieschner et al., 2004) | Client engagement in Psychotherapy (Holdsworth et al., 2014)     | Conceptual framework of Engagement (Perski et al., 2017)  | Effective Engagement (Yardley et al., 2016)  |
| Context                  | In-person mental health interventions   | In-person mental health interventions                            | Digital health behavior change interventions  | Digital health behavior change interventions   |
| Predictors of Engagement | Limitations to volitional control<br>Motivation to engage in treatment                            | Client motivation<br>Therapeutic relationship                    | Intervention<br>Context<br>Changes in target behavior (through positive feedback loop)                                  | Phase of engagement (example of possible phase combination)<br>1. Inside-intervention engagement<br>2. Inside- & outside-intervention engagement<br>3. Sustained engagement<br>4. Possible re-engagement |
| Definition of Engagement | Adherence   | Attendance<br>Efforts within session<br>Efforts between sessions | Extent of usage<br>Subjective experience of attention, interest and affect  | Adherence<br>Real life behavior change<br>Outside-intervention effort  |
| Outcomes of Engagement   | Treatment outcomes, moderated by problem characteristics and treatment effectiveness              | Treatment satisfaction<br>Treatment outcomes                     | Changes in mechanisms of action<br>Changes in target behavior<br>Changes in engagement (through positive feedback loop) | Sustained engagement   |



**Fig. 2.** Integrative conceptual model of engagement with mental health and health behavior change interventions. Note: 1) The dynamic nature of engagement is visualized by the permeable dotted outline, indicating that disengagement and re-engagement are possible throughout the engagement process, 2) not all predictors or outcomes may be relevant for a specific intervention depending on the nature of the intervention and context.

engagement with the intervention itself and in daily life (behavioral engagement).

Following this feedback loop, the perception of desired change after initial engagement will then continue to grow throughout the change process. However, someone will not endlessly engage with an intervention (Yardley et al., 2016). At some point, the intervention goals are met. This point of satiation creates a shift in the engagement dynamic by putting a halt to the feedback loop between the perceived effectiveness and engagement with the intervention. This means that someone starts to disengage with the intervention and enters the phase of sustained engagement and continues to apply the skills they have learned and the insights they have had to their daily life to sustain the achieved change, while no longer using the intervention itself (Yardley et al., 2016). At some point, someone may need to re-engage with the intervention for additional support or relapse management. Engagement with the intervention is then re-activated, as someone again has a motive to

engage with the intervention (Yardley et al., 2016). This re-engagement may take on many different forms, from starting a new therapy to revisiting the relapse management plan in a mobile application for smoking cessation, for example. In Fig. 2, the process of (re)engagement is visualized by the permeable dotted outline.

The example given above considered a situation where someone perceives desired intervention effects, but the same associations are not applicable for undesired intervention effects. When engagement does not lead to desired changes or when someone perceives these changes as insufficient, further engagement will decrease to the point where the costs of engagement outweigh the benefits of engagement, leading to disengagement with the intervention.

## 4. Discussion

### 4.1. Summary

Engagement is a complex, dynamic, and multidimensional construct. It plays an important role when interacting with an intervention but is inconsistently conceptualized both within and between disciplines. The goal of this review was to integrate definitions and theoretical models on engagement with mental health interventions and health behavior change interventions, delivered in-person, digitally, or blended, and use this as input for an integrative model: the Integrative Conceptual Model of Engagement with Mental Health and Health Behavior Change Interventions. We included forty studies defining engagement and four theoretical models. Our Integrative Conceptual Model of Engagement with Mental Health and Health Behavior Change Interventions presents engagement as a multidimensional, complex, and dynamic process, consisting of behavioral-, cognitive-, and affective dimensions. Complex, because engagement is influenced by various contextual predictors, such as someone's circumstances, societal factors, and the content and delivery of the intervention (Drieschner et al., 2004; Holdsworth et al., 2014; Perski et al., 2017; Yardley et al., 2016). Moreover, engagement is also influenced by dynamic predictors such as motivation and the relationship someone has with their care provider, which is also influenced by engagement itself (Drieschner et al., 2004; Holdsworth et al., 2014). Engagement itself is dynamic because levels of engagement and expression of engagement (i.e., within or outside of the intervention context) vary throughout a therapeutic or behavior change process and are part of a positive feedback loop between engagement and an intervention's effects (Perski et al., 2017; Yardley et al., 2016).

With our model, we aim to work towards a contextual engagement process that highlights the complex nature of engagement, by incorporating not only the someone's personal context, but also the intervention characteristics, the relationship with the care provider, and the perceived effectiveness of the intervention. Other researchers also called for a contextual, process-based approach. For example, Lipschitz et al. (2023) describe the "engagement problem" as an implementation problem, arguing that primarily interventions implemented in natural settings are struggling with problems regarding engagement, while engagement is most necessary in exactly those natural settings. There lies an opportunity for researchers in not only considering the active components of the intervention while conducting research, but also the science of implementation, design, and acceptability.

We observed a strong overrepresentation of behavioral engagement dimensions, both in the theories discussed and in the definitions of engagement, while cognitive engagement and affective engagement are not as well-defined. When approaching engagement from a behavioral perspective only one only considers observable behavior and neglects many subjective and contextual influences. Therefore, an integrative model that takes the complexity of engagement into account is necessary.

#### 4.2. Future directions

Our model can be used for different purposes. It can provide a framework for intervention development, a tool for research design, or a resource for implementation. There seems to be a consensus on the three engagement dimensions (i.e. behavioral-, cognitive-, and affective; Kelders et al., 2020; Nahum-Shani et al., 2022; Perski et al., 2017), but more insight is needed into the relationship between the different engagement dimensions, its predictors, outcomes, dynamic processes, and the concept of sustained engagement. Longitudinal designs and mixed-methods studies seem to be appropriate ways to address research questions related to the process of engagement (Bijkerk et al., 2023), alongside methodological approaches such as dynamic modeling, that allow for in-depth analysis of the dimensions of engagement and its patterns. Additionally, we urge researchers to include measures of cognitive-, and/or affective engagement alongside behavioral measures when studying engagement. We observed a rise in the use of cognitive and affective dimensions, which is a positive development. However, there is still much to learn about these dimensions of engagement. These “softer” subdimensions of engagement are more difficult to measure than behavioral engagement (Bijkerk et al., 2023), which may explain why behavioral engagement is so dominant in research and theories. To measure these dimensions researchers validated measures of cognitive-, and affective dimensions are needed, of which more questionnaires are being developed (Bijkerk et al., 2023).

Multidisciplinary collaboration, co-creation, research designs that allow for flexible implementation (e.g. proof-of-concepts design) are key, given that engagement is not only relevant in behavioral science but is also part of other disciplines such as educational science and game development (Kelders et al., 2020). By including perspectives from other disciplines, especially regarding cognitive and affective dimensions of engagement, we can work towards an integrative understanding of engagement. Our model aids multidisciplinary collaboration by already including perspectives from different disciplines.

When implementing our model in research or practice, one may find that not all dimensions necessarily are relevant to a specific intervention or context. Therefore, the proposed conceptual model should be viewed as a starting point for the conceptualization of engagement within an intervention's unique context. In other words, our model does not propose a static definition of engagement but rather provides a conceptual framework that helps researchers think about engagement in a more comprehensive, contextual, and holistic manner.

#### 4.3. Limitations

For the aims of this review, an integrative format was considered most suitable, given our aim to discuss and synthesize key literature on engagement from mental health and health behavior change literature, rather than to provide an exhaustive overview of definitions. The choice for an integrative review comes with strengths as well as some limitations. We conducted our literature research as thoroughly as possible and analyzed forty definitions. We purposefully selected four theoretical models that complemented each other in terms of complexity and view on engagement, and covered the different fields and delivery modes that were integrated in this review, rather than reviewing all available models in detail. This leaves open the possibility that we missed important theoretical influences of other models. A second limitation is that only one of the authors selected the literature. Nevertheless, as stated in the Methods section, an extensive iterative review process took place with all authors to ensure a rigorous literature analysis process.

Related to the overrepresentation of behavioral engagement in research, another limitation is that the conceptualization of the cognitive and affective dimensions of engagement in our model might be limited. There is no consensus on the definition of cognitive and affective engagement and a large debate on its overlap with related factors such as motivation. Considering the fast pace of engagement research,

there is a possibility that soon new insights arise that might contradict the model we propose. However, we carefully composed the model to not form a static conceptualization of engagement and to be as flexible as possible.

#### 4.4. Conclusion

Our goal was to develop an integrated model of engagement that can be used across multiple contexts and shows the bigger picture of engagement. We found many differences in how engagement was conceptualized, and many commonalities. We do not view one approach as better than others but consider all conceptualizations as important pieces of the bigger picture we aimed to construct – a picture that is not seen when considering the pieces separately.

#### Declaration of competing interest

The first author has a part-time position as a psychologist at Oh My Mood and a part-time position as an external PhD-candidate at Maastricht University. Oh My Mood finances the external PhD position of the first author at the Maastricht University. Oh My Mood had no involvement in the design, data collection, data analysis, writing of the report, and publishing process of this paper. All other authors report no conflict of interest.

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