‘I Can’t Get No Satisfaction’… Experience in the treatment, satisfaction, and professional support of young depressed people using SPARX

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Summary. Aim. Depression in young people is common and can lead to poor long-term outcomes. Digital therapies are a promising means of promoting access to care. Currently, among the digital treatments for depression in adolescents recognized by the NICE guidelines, there is SPARX (Smart, Positive, Active, Realistic, X-factor), based on Cognitive Behavioral Therapy, CBT. This narrative review aimed to evaluate: 1) Who were the depressed young people who used SPARX and what was their experience with the treatment? 2) Were users satisfied with the SPARX treatment? Did the youth’s perceived level of satisfaction with using SPARX impact completion rates? 3) What was the role of professionals (researchers, consultants, teachers) in the SPARX studies? Has their support in running SPARX affected completion rates? Methods. A narrative review of the English literature was performed. The articles were searched in Pubmed, SCOPUS, and Web of Science databases (from 2012 to 2023) with keywords such as ‘SPARX,’ depression and ‘young adult’. Results. Of 557 papers, 18 were included in our review. The young people who used SPARX were students or adolescents from special help-seeker populations at risk or with mild to moderate depression. The highest satisfaction levels were present in users of primary health services, such as general practice and counseling services. The support of the school counselor and experts in mental health clinicians was instrumental in impacting user satisfaction and completion rates. The personalization of the game in terms of user culture - symbols, language, norms, values, and artifacts; the customization of the avatar, the gender identity; a narrative structure; the presence of a guide character (virtual therapist); the CBT homework seemed to represent crucial SPARX characteristics related to satisfaction and completion rates. Discussion and conclusions. Our narrative review provides an overview of the main results of using SPARX with interesting considerations that may suggest improvements for broader use and diffusion of this digital treatment.

Key words. Adolescent, cognitive-behavioral treatment, depression, gamification, SPARX, treatment adherence, young adult.

Introduction

Due to the recent pandemic related to Covid-19, there has been an increase in depressive and anxiety disorders in the world population. Recently, the 2022 World Health Organization Mental Health Report reported a rise in depression of 28% compared to pre-pandemic data.
A similar trend was found among young people, with the adolescent population representing the most affected by emotional disorders. Rapid physical, psychological, and social changes and a period of greatest vulnerability to the onset of mental disorders characterize adolescence. Adolescents are becoming adults and more willing to make crucial decisions and life choices. Despite suffering severe psychological distress, they find it challenging to ask and to get or to adhere to psychological or psychiatric treatments. According to the literature, approximately a third of adolescents do not complete the recommended psychosocial or psychopharmacological therapies. Many factors have been identified to overcome barriers to treatment adherence. Factors that positively impact compliance with adolescents treatment can be divided into factors mainly related to the therapeutic setting and the external social context. Among the former, effective physician-patient communication was identified; positive beliefs about and, therefore, acceptance of the prescribed treatment; non-judgmental setting; more contact with mental health professionals and better-planned appointments; involving adolescents in the development of their mental health care; suitable and planned patient psychoeducation; taking into account patient expectations; establish active physician-user cooperation. Furthermore, among the factors implicated in the social context, it was highlighted how higher levels of education and the family’s socio-economic status seem to be positively correlated with the adherence of adolescents. On the contrary, low solidarity among the family or close friends negatively influenced treatment adherence.

Digital Mental Health (DMH) appears to be a promising solution to improve access to mental health services and to overcome barriers of adherence and stigma. DMH is a term used to indicate all technologies used in the mental health field to make diagnoses, monitor the subject’s clinical conditions, and support the healthcare professionals’ decisions and interventions. DMH interventions can overcome many barriers, such as inhibiting help-seeking, accessibility in rural contexts, and reducing the burden on service providers. Drop-out subjects and non-completions are commonly reported in the literature, and adherence to digital health programs is also low in adolescents.

According to the complexity of these issues, different factors negatively impact the engagement and interaction with online programs, including lack of time, access and technical issues, no perceived need for help, program relevance, inappropriate content or repetitiveness, doubt regarding program effectiveness, preferences for face-to-face help, concerns about privacy and anonymity, or perceiving the program to be boring or activities laborious, a poorly designed or delivered product. Among the barriers to adherence to treatment, an important role is played by the severity of the disease and how adherence is operationalized in the various studies. An improvement could be providing personalized interventions according to the individual’s severity of illness, allowing participants to select the order of module completion or the choice of session scheduling with customized reminders. Furthermore, designers could incorporate various activities into DMH programs, including multiple-choice quizzes and case-enhanced learning strategies that use educational stories to illustrate problem-solving.

Gamification (e.g., use of avatars, challenges, prizes, scores, etc.) and the use of Serious Games, is based on the e-learning approach. Several studies demonstrate that digitalized CBT programs, which use the paradigm exposed above, acquire a greater attractive, engaging and effective potential than those that do not use them. Gamification-based DMH interventions show their usefulness, for example in ADHD, autism spectrum disorders, eating disorders, post-traumatic stress, impulse control disorders, depression, schizophrenia, dementia and even in healthy aging. Although there is much evidence on the effectiveness of serious games, to date there are many improvements to be made to understand how to enhance the compliance of these treatments.

In this innovative scenario of DMH, we investigate the serious game SPARX (Smart, Positive, Active, Realistic, X factor), based on Cognitive Behavioral Therapy, CBT practices, one of the most used active RCT interventions. This intervention is included in the Digital CBT for mild depression for young people aged 12 to 18 by the National Institute of Health and Care Excellence (NICE). There are different versions of SPARX, although each version is articulated in seven modules (30-40 min each), including 1) Psychoeducation about depression and an introduction to the cognitive behavioral therapy model; 2) Activity scheduling and behavioral activation; 3) Dealing with strong emotions and interpersonal skills (assertiveness, listening, and negotiation); 4) Problem-solving and cognitive restructuring; 5) Cognitive restructuring and interpersonal skills; 6) Recap of all skills, mindfulness (tolerating distress) and relapse prevention (knowing when to ask for help). SPARX is based on a 3D fantasy world, where it is possible to choose and customize its avatar and to interact with a ‘guide’ who plays the role of therapist. The modules are articulated as game levels, and a maximum of two levels per week is suggested.

This narrative review aims to identify the existing literature on SPARX for depressed youth populations, their experience of the treatment, and their satisfaction. Considering the role of therapists, the review also intended to clarify their role when involved in
the study design. Special attention was reserved to identify elements influencing the SPARX treatment’s completion rate.

**Methods**

**RESEARCH QUESTIONS**

Three main research questions (RQ) were addressed:
1. Who were the young, depressed people who used SPARX and what was their experience with the treatment?
2. Were the users satisfied with the SPARX treatment? Did the level of satisfaction for perceived SPARX utilization by young people impact completion rates?
3. What was the role of professionals (researcher, counselor, teacher) in the SPARX studies? Did their support in SPARX execution influence the completion rates?

**STUDY DESIGN**

Three reviewers (RR, SM, SDV) searched PubMed, SCOPUS, and Web of Science databases using the search terms reported in figure 1. Researchers explored the term ‘SPARX’ and then narrowed the searches to depressive symptoms with the term ‘depression’ and the age group of interest, ‘young adults’. From the search carried out for the term ‘SPARX’, 441 results emerged; 106 studies were found from the terms ‘SPARX and Depression’; 10 scientific works were found with the terms ‘SPARX and Young Adult’, for a total of 557 scientific studies. Among these, 40 works were duplicated in the various searches, for a total of 517 studies that were analyzed. Among the exclusion criteria we identified the studies in which ‘SPARX’ represents a mobile APP on learning rural and agricultural concepts; The SPARX Trial which refers to a multicenter, randomized, controlled, single-blinded, study designed to test the feasibility of using high-intensity exercise to modify symptoms of Par-
kinson Disease; all those scientific works that dealt with the SPARC protein involved in inflammatory processes were excluded; SPARC works of low quality and in which only the protocol without results was reported were excluded.

Results

After evaluating the search terms ‘SPARX,’ ‘SPARX AND Depression,’ and ‘SPARX AND Young Adult,’ the searches yielded 557 articles across the databases, analyzing the records by title and abstract. Exclusion criteria were applied, and 18 studies were recruited from 2012-2023. Among these studies, nine presented quantitative data, eight qualitative data, and one combined quantitative and qualitative data included in our work.

Who were the young, depressed people who used SPARX and what was their experience with the treatment?

Characteristics of Quantitative and Qualitative Studies using SPARX

Table 1 (Supplementary material available in the online version of the paper) summarizes the characteristics of the included quantitative studies.

Six studies were conducted in New Zealand22-27, one in The Netherlands28, one in Australia29, one in Ireland30, and one in Canada31. All studies included adolescents in the age range of 12-19.

Out of ten quantitative studies, six are RCT studies22,23,28,31, two are real-world studies26,27, one study is a cohort study24, and one is an observational study24.

Regarding the features of the sample in these studies, one study recruited a clinical population affected by depressive symptoms who asked for help from health services25; one study was conducted in a hospital youth inpatient unit24; two studies evaluated students with depressive symptoms in a school prevention context26,31 or isolated communities30; two studies in ‘alternative school settings’22,29. Two studies were conducted in the transgender or intersex adolescent population26,27 based on a Rainbow SPARC version developed for adolescents with depressive symptoms who are also sexually attracted by the same sex, both sexes, or who were questioning their sexuality (i.e., sexual minority youth)22. One study included a population of adolescent male offenders due to crime25.

The samples included in the studies show a wide heterogeneity. From a clinical point of view, the severity of psychopathology ranges from acute psychosis24 to depression23 and to prevention of depression risk28. The considerated studies privilege culturally specific, community-led prevention programs with limited access to mental health resources, as for Maori22 and Inuit young suffering people30, gender minorities26,27 and ‘special’ population, as alternative school settings students25,29 and young offenders25.

According to intervention treatment, five studies administered SPARC without external psychological supports24,26,27,30,31; one study included school counselors’ support in recruiting young users22, and in two studies researchers gave their support and supervision to subjects included from alternative education settings22,29. One study administered SPARC supported by teachers28; one evaluated the impact of SPARX-R 1.0 and the compulsory rehabilitation program MYND supported by social workers25.

Of the nine qualitative studies included in the present review and described in Table 2 (available online), four studies carried out focus groups on a population of adolescents not belonging to ‘special populations’18,33-35, two studies carried out focus groups including LGBTQ+ adolescents36,37. Two studies carried out focus groups and semi-structured interviews considering clinicians’ opinions (counselors, clinical psychologists, nurses, etc.)18,38.

Only one article conducted focus groups evaluating the point of view of family members28, while two studies reported focus groups on communities with limited access to mental health resources (Maori)39,40. Regarding the mean topic discussed in the different focus groups, two studies considered the issues related to the satisfaction and usefulness of SPARC23,35,40 and two focus groups evaluated SPARC satisfaction with sexual minority issues36,37. Two focus groups with clinicians included patient satisfaction and technical, structural, and monitoring implementations of SPARC16,38. Family members participated in a focus group investigating their opinions on SPARC’s contents and cultural style39. Fleming et al.34 conceptualized their focus group on the perceived usefulness of SPARC in preventive terms of depression (e.g., anger, stress, etc.).

Were the users satisfied with the SPARX treatment? Did the level of satisfaction for perceived SPARX utilization by young people impact completion rates?

Only five studies evaluated the level of SPARC satisfaction of participants through the administration of a short self-report questionnaire17,23,24,28,33, comparing them with levels of completion rates levels (tables 3 and 4).

Concerning the level of satisfaction users express, what emerges from these studies is unclear.

In Merry et al.23, SPARC participants expressed high satisfaction levels, although statistically significantly lower than youth receiving TAU (face-to-face counseling). The good results of the study appeared to be attributed to school counseling services and the recruitment of youth clinics in both study arms. The
professionals providing psychological interventions in the TAU arm were experienced counselors, establishing an excellent therapeutic alliance with young users.

The level of satisfaction monitored was also high in the inpatient ward study of Bobier et al., although only 10% completed the SPARX program. One patient stated that she preferred individual talking therapy to computer treatment, while another said that SPARX made her feel worse.

In Poppelaars et al., although the two programs (SPARX and OVK) generated the same satisfaction rate (not very high), OVK was perceived as more attractive and more helpful in daily life, despite the completion rates. These data probably relate to the fact that no cultural adaptations were made for Dutch adolescents in SPARX.

Even the study by Kuosmanen et al. showed a low level of satisfaction expressed by the SPARX-R group; only 30% of the sample completed virtual therapy. Staff members reported that young users felt more comfortable when the researcher was present, suggesting the need for professional mental health support to monitor student reactions and provide prompt support.

The SPARX-R version, providing practical skills for young people when depressed, down, angry, or stressed, received a modest satisfaction rating. More than half of the participants considered the program helpful for a young person struggling. However, only a third indicated they would recommend the program to a friend. A minority found the program uncomfortable, and a quarter stated that they were concerned about privacy. No clear patterns emerged when comparing user satisfaction ratings and completion rates. Most participants evaluated most levels as easy to use, enjoyable, and valuable.

It remains unclear whether young, depressed people are satisfied with SPARX if we assume that satisfaction would impact completion. There may be a full completion both with high levels of satisfaction and with low levels of satisfaction, suggesting that other factors may be involved in the appreciation of the SPARX intervention. The study published by Merry et al. is the only one that presents high satisfaction levels with high completion rates. Instead, in Poppelaars et al., low levels of satisfaction presented high completion rates, probably related to the fact the participants were offered a modest financial reward to participate in the post-test and follow-ups. In Bobier et al., satisfaction levels were high. Still, completion rates were low because the population was recruited in a hospital inpatient unit, and the subjects presented different clinical pictures. The ‘special’ sample of students, not depressed but at risk of depression and leaving school early and attending an alternative education (AE) program, reported low levels of SPARX satisfaction and completion rates.

This finding could be justified by the difficulty in recognizing the real challenges of these young, troubled people.

**What was the role of professionals (researcher, counselor, teacher) in the SPARX studies? Did their support in SPARX execution influence the completion rates?**

Five quantitative studies considered the role of the professionals within SPARX in supporting the intervention and six qualitative studies dealt the topic ‘the importance of the therapist’ within the various focus groups (table 3, available online).

In two studies, the support was provided by the same researchers, in one study by teachers, in one study by a school counselor. In one study, the researchers involved a social worker.

Merry et al. showed how the role of counselors was helpful in recruiting subjects who could benefit from SPARX. The school counselors knew teenagers and suggested this treatment based on the more appropriate clinical indications. They could facilitate access to treatment for young people who may be reluctant to have more conventional therapy, showing how such a role of a counselor in recruitment leads to high completion rates and satisfaction (tables 3 and 4, available online).

The therapist involved in the Fleming et al. study was a Ph.D. candidate with experience as a clinician in adolescent health and mental health services, weekly visiting or telephoning the students in their classroom. He addressed any safety concerns or problems that may have arisen or supported students using the program. The fact that the intervention was offered during class time may have contributed to the high completion rates in SPARX (69%).

The Australian study by Perry et al. does not include health professionals. Indeed, the SPARX intervention was completed over 5 to 7 weeks in class under teacher supervision, reporting a satisfactory completion rate. The Authors underlined the success of what could be defined as the first step in a stepped-care approach to mental health interventions, whereby young people within the school setting are provided with access to a universal, skills-oriented intervention, with those who require additional support being stepped up to a more intensive one.

The Irish study by Kuosmanen et al. included both researchers at the program’s start and a staff member who moderated the program. The researcher visited centers and addressed technical issues. The staff members were provided with a Program Manual and Study Instructions with detailed information on the day-to-day rollout of the study and the completion of the online assessment questionnaires. Also, the staff delivering the program was given a list of each student’s SPARX login details in case they forgot them.
The protocol of Fleming et al. was more articulated than that of other considered studies since SPARX-R was an add-on component. The professionals involved were social workers working at a compulsory day-based rehabilitation program for offenders (Mentoring Youth New Directions; MYND) for the study period, all of whom participated in the study. Each participant worked with their social worker to determine specific activities and goals.

Both Kuosmanen et al. and Fleming et al. reported low completion rates (table 4, available online). The samples considered in their study concerned ‘troubled teens’ exhibiting high levels of mental distress and legal/social-economics difficulties that presumably needed more support from a professional in a face-to-face mode or from online peer support.

As regards the six qualitative works that dealt with the ‘therapist’ topic within the various focus groups, it was highlighted that the majority of them considered the presence of the clinical therapist crucial both in the recruitment and in the monitoring of the SPARX treatment, not only to increase satisfaction and completion rates, but also to improve the therapeutic alliance (table 3, available online).

In particular, in the focus groups including both clinicians and adolescents, it emerged that the presence of a clinician is relevant both in the face-to-face mode and through online active monitoring of the progress of the SPARX treatment.

In two focus groups conducted on LGBT and non-LGBT adolescents, enrollment in the program and the support for dealing with emotional problems and talking about emotions were effectively promoted by the figure of a clinical counselor.

Instead, a therapist’s support did not seem necessary to learn the skills of the SPARKS treatment in the study involving Maori parents/caregivers and adolescents. Moreover, the presence of the therapist seemed to generate embarrassment for young people and create resistance to treatment.

Discussion

The authors investigated the population who used SPARX, their experience, and their perceived satisfaction with this online treatment as a serious game for depression. They also identified which type of professionals were involved in the SPARX treatment and whether their support could impact satisfaction levels and compliance rates.

The population that uses SPARX is heterogeneous, and there are only a few studies conducted on the use of this serious game on users who require help for depressive symptoms. Most studies have been conducted on specific populations with limited access to mental health resources, fully reflecting the aims of digital mental health and considering the use of technology as a fundamental resource to overcome socio-economic and cultural limits to access to care. Special populations, such as offenders or difficult young adolescents, underlined the need to adapt SPARX, as other serious games, to different young languages and backgrounds. These data highlight the importance of tailored interventions that can address the complexity of the depressive experience and the adolescents’ various socio-economic and cultural settings. Our results are in line with other studies that highlighted how user’s characteristics, such as their age, development, gender identity, and the nature and severity of their difficulties, must be taken into consideration to understand better who to provide this intervention.

Young users who decide to use a serious game like SPARX will have individual preferences regarding the content and design of technologies and their overall approach (e.g., social media, chatbot). After all, some might prefer to engage only with face-to-face therapy or self-help booklets. Therefore, it seems crucial that young people have a choice, where possible, regarding how they access support.

The results are ambiguous regarding the satisfaction levels of young people who use SPARX. This narrative review revealed the highest satisfaction levels in young help-seekers to mental health resources. However, satisfaction with the use of SPARX does not appear to be high in young adults with subclinical depression or at risk of depression onset but not yet showing severe emotional suffering. Moreover, these data linked to satisfaction levels do not impact completion rates, suggesting that many other aspects may do it. These findings can be justified by the difficulty of adolescents identifying depression symptoms, often having abnormal experiences referred to as transdiagnostic psychopathological patterns.

Narrative structure, a Guide character – virtual therapist and challenges – CBT homework tasks seemed to contribute in satisfaction and completion rates also. A relevant role in the completion rates is also played by customization of the game in terms of users’ culture - symbols, language, norms, values, and artifacts, and user gender identity, reflected through the avatar gender. Recent literature supports our data by suggesting that the variability in satisfaction outcomes may be related to differences in the virtual game elements and the suitability of specific gamification components for customers with different demographic characteristics. Indeed, the correlation between satisfaction and completion rate should consider the potential benefits and costs of personalization versus standardization of gamification.

Although SPARX is a serious game not driven by face-to-face support, different professional figures were involved in the selected studies to support SPARX users. Researchers, school counselors, men-
tal health clinicians, teachers, and social workers were among these. If the role of professional support in addition to the treatment was unclear in adolescents and young adults\(^5\), our findings showed that the presence of the school counselor was beneficial in impacting satisfaction and completion rates by recruiting and selecting the users who could benefit most from it. Moreover, it has been proven that monitored settings, such as primary care settings, may increase enrollment in online youth programs.\(^6\)

The presence of a researcher with clinical experience in mental health, who provides emotional support supplementary to SPARX in face-to-face or online/telephone mode, seemed to impact the percentage of completion rates. Consistently, whereas teachers and researchers gave support without any clinical mental health experience, satisfaction levels remained low along with those of completion rates, underlining the importance of integrating mental health professionals into SPARX. A recent review confirms these data, highlighting how the assistance provided by professionals with clinical training and experience could improve satisfaction levels and completion rates in supporting the utilization of serious games.\(^7\)

Furthermore, these data found in the present study conducted on SPARX are in line with the data also present in the literature on other serious games; in fact in a recent meta-analysis\(^8\) it emerged that the most used serious games for the treatment of depression (including SPARX, Wii Fit, Kinect Sport, MindLight, etc.) present a high number of dropouts and missing data in the follow-up phase and it is important to collect as much data as possible to enhance the use of serious games in clinical practice. It would be interesting to delve deeper and compare in future studies how clinician support and the administration practice could impact on completion rates in different serious games treatments.

**Conclusions**

To the best of our knowledge, our narrative review, including quantitative and qualitative studies, is the first to analyze and discuss the professional’s role in supporting SPARX, an issue not considered in previous reviews. Following the growing increase in depression among young people, it is necessary to ask how services and therapeutic programs can facilitate access to this population and help them maintain adherence to treatments. DMH and gamification seem to be one way to overcome barriers (e.g., stigma, costs, accessibility in rural contexts) that prevent young people from asking for help. In particular, gamification could be a promising paradigm for building digital mental health programs that promote stimulating engagement.

More accurate answers could be given to our research questions if further studies will better define the characteristics of the young depressed users who can benefit most from these digital interventions, mainly addressed to primary care contexts, in a sort of ‘precision serious game’ preventive treatment.\(^9\)

We foresee that future directions should also include optimizing user choice, as for typical for Internet applications, and improving integration between digital tools and clinical services.

**Conflict of interests:** the authors have no conflict of interests to declare.

**References**

15. Achilles MR, Anderson M, Li SH, Subotic-Kerry M, Parker B, O’Dea B. Adherence to e-mental health among youth:
considerations for intervention development and research design. Digit Health 2020; 6: 2055207620926064.


<table>
<thead>
<tr>
<th>Authors (location)</th>
<th>Total, n</th>
<th>Experimental design</th>
<th>Population target and setting</th>
<th>Intervention description</th>
<th>Primary outcome (measure)</th>
<th>Main findings</th>
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<tr>
<td>Fleming et al. (New Zealand)</td>
<td>22</td>
<td>Pragmatic RCT</td>
<td>Adolescents (18 men, 14 women, aged 13-16 years) excluded or alienated from mainstream education with mild to moderate depressive symptoms. Māori youth (34%). Setting: alternative schooling programs for those excluded from mainstream education.</td>
<td>SPARX + Weekly tutor supervising by telephone</td>
<td>Depression (CDRS-R)</td>
<td>There were significant differences between the CBT and usual group in CDRS-R with reduced depressive symptomatology; remission was significant at the 10-week follow-up. There were indications of the potential efficacy of SPARX in alternative schooling environments.</td>
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<td>Merry et al. (New Zealand)</td>
<td>187</td>
<td>RCT</td>
<td>Adolescents (63 men, 124 women, aged 12-19) help-seekers for symptoms of mild-to-moderate depression. Setting: primary healthcare sites (youth clinics, general practices, and school-based counseling services).</td>
<td>SPARX + In the last module Recap of all skills; Mindfulness and Relapse prevention + Counsellor supporter</td>
<td>Depression (CDRS-R)</td>
<td>The evaluations were performed at the beginning of the study, after the intervention, and at three months of follow-up. Per-protocol analysis showed a non-inferiority of SPARX compared to TAU. The post-intervention analysis showed a significant reduction rate in the SPARX arms.</td>
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<td>Bobier et al. (New Zealand)</td>
<td>20</td>
<td>Observational study</td>
<td>Adolescents (12 men, 8 women, mean age 16.5 years). Diagnosis: Bipolar mood disorders (n=5); Unipolar mood disorder (n=10); Anxiety disorders (n=3); Psychotic disorder (n=1)</td>
<td>SPARX</td>
<td>Depression (RADS-2; MFQ)</td>
<td>Most patients offered therapy agreed to trial SPARX, with 60% continuing beyond the first module and 10% (2 subjects) completing the program before discharge.</td>
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<td>Poppelaars et al. [31] (The Netherlands)</td>
<td>208</td>
<td>RCT</td>
<td>Women students with subclinical depression (Mean age 13.35 years).</td>
<td>Depression (RADS-2)</td>
<td>SPARX</td>
<td>51</td>
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<tr>
<td>Kuosmanen et al. [29] (Ireland)</td>
<td>66</td>
<td>RCT</td>
<td>High school students (68 men, 78 women, aged 15-20) leaving school early and attending an alternative education (AE) program at risk of developing depression.</td>
<td>Anxiety Depression (GAD-7; SMFQ)</td>
<td>SPARX-R + Researcher support</td>
<td>30</td>
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<th>Control group, n</th>
<th>Main findings</th>
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<td>Perry et al. 28 (Australia)</td>
<td>540</td>
<td>RCT</td>
<td>Final year secondary students (mean age 16.7 years). Setting: SPARX-R was delivered to students on desktop computers via the Internet in school classrooms to prevent depression before facing a significant stressor, final secondary school exams.</td>
<td>Depression (MDI)</td>
<td>SPARX-R + supplemented with a paper notebook for students to review key messages from each module and record personal comments + Teacher support</td>
<td>242</td>
<td>298</td>
<td>Assessments were at baseline, after intervention, and at 6-month and 18-month follow-ups. Compared to controls, participants in the SPARX-R condition showed significantly reduced depression symptoms at post-intervention and 6-month post-baseline but not at 18-month post-baseline.</td>
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<tr>
<td>Fleming et al. 25 (New Zealand)</td>
<td>40</td>
<td>Step-wise cohort study</td>
<td>Male adolescents (aged 14-17) referred for offending to a community rehabilitation service. Setting: MYND office, home, or other private space.</td>
<td>Depression (RADS-2; CDRS-R)</td>
<td>Mentoring Youth New Directions, MYND* + SPARX-R 1.0 (revised version of SPARX) + Social Workers support</td>
<td>19</td>
<td>21</td>
<td>Assessments were completed within the first two weeks of commencing the MYND program and then at 10 and 20 weeks after commencement. SPARX-R cCBT was not engaging for these participants, highlighting that it cannot be assumed that cCBT has proven acceptable and effective in some settings.</td>
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*The MYND program is a compulsory community rehabilitation program for males aged 14-17 years.
whom statutory authorities have referred for offending; it is an alternative for young people who would otherwise be given custodial sentences, frequently for convictions related to violence.

Lucassen et al. (New Zealand)

Female, male, and transgender (0.3%) adolescents (aged 12-19) with different degrees of depressive symptoms (mild to severe).

Free online self-help intervention delivered via personal computer.

Depression (PHQ-A)

Most transgender registrants (69.0%) who completed PHQ-A at baseline were categorized as having high mental health needs, significantly more than male and female registrants. Improvement of depressive symptoms only in men and women, not in transgenders.

Lucassen et al. (New Zealand)

Male, female, and intersex (0.6%) adolescents with different degrees of depressive symptoms (mild to severe).

Free online self-help intervention delivered via personal computer.

Depression (PHQ-A)

76.3% of intersex users had high levels of depression and/or self-harm and suicidal ideation. Unable to meaningfully investigate any reductions in depressive symptoms over time in the intersex population.

### Table 1.

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<td>Lucassen et al. (New Zealand)</td>
<td>9079</td>
<td>Large open real-world trial (Quantitative analysis of 5 years of usage data from the national delivery of SPARX in New Zealand).</td>
<td>Male, female, and transgender adolescents (0.3%) with different degrees of depressive symptoms (mild to severe).</td>
<td>Free online self-help intervention delivered via personal computer.</td>
<td>Depression (PHQ-A)</td>
<td>Most transgender registrants (69.0%) who completed PHQ-A at baseline were categorized as having high mental health needs, significantly more than male and female registrants. Improvement of depressive symptoms only in men and women, not in transgenders.</td>
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<td>Lucassen et al. (New Zealand)</td>
<td>8872</td>
<td>Large open real-world trial (Secondary analysis of SPARX usage data over 5 years).</td>
<td>Male, female, and intersex (0.6%) adolescents with different degrees of depressive symptoms (mild to severe).</td>
<td>Free online self-help intervention delivered via personal computer.</td>
<td>Depression (PHQ-A)</td>
<td>76.3% of intersex users had high levels of depression and/or self-harm and suicidal ideation. Unable to meaningfully investigate any reductions in depressive symptoms over time in the intersex population.</td>
</tr>
</tbody>
</table>
### (Continued) - Table 1.

<table>
<thead>
<tr>
<th>Authors (location)</th>
<th>Total, n</th>
<th>Experimental design</th>
<th>Population target and setting</th>
<th>Primary outcome (measure)</th>
<th>Intervention description</th>
<th>Intervention group, n</th>
<th>Control group, n</th>
<th>Main findings</th>
</tr>
</thead>
</table>
| Bohr et al.30 (Canada, Inuit population) | 24 | Pilot study Modified RCT | Inuit adolescents, aged 13-18, with limited access to specialized services.  
**Setting:** Youth played SPARX on the laptops in either the community facilitator’s office or in an office in their school. | Depression (CESD-R) | SPARX | 20 | Waitlist control | 19 | Assessments were at baseline and post-intervention. The participating youth felt less hopeless and engaged in less self-blame, rumination, and catastrophizing following the SPARX intervention. However, the participants did not show a decrease in depressive symptoms or an increase in formal resilience indicators. |
<table>
<thead>
<tr>
<th>Authors (location)</th>
<th>Participants</th>
<th>Methods</th>
<th>Results</th>
</tr>
</thead>
</table>
| Lucassen et al.\(^{36}\) (New Zealand) | N=9  
(LGB young people; 56% women, aged 16-27)  | Exploratory study based on 3 focus groups on: 1. explore the challenges that youth of LGB face; 2. determine whether the identified challenges LGB youth face could and should be addressed in SPARX (and if so, investigate how a cCBT program could be successfully adapted for LGB youth); 3. help in the pre-testing design, characters, and scenarios of prototypes of a cCBT program (SPARX). | The prototypes of a ‘generic’ cCBT program did not address all the issues that youth with LGB face. It proved feasible to adapt a cCBT program to take this feedback into account (premises for the creation of Rainbow SPARX, \[3\]).                                                                                                                                                                                                                                                                                       |
| Cheek et al.\(^{33}\) (Australia)      | N=16  
(12 men and 4 women, aged 13-18, living in a small rural Australian town)  | Focus groups and semi-structured interviews about evaluating SPARX (Personalization, Engagement, Stigma.) | Computerized therapy offered in ways that support privacy and choice can improve access to treatment for rural youth. Issues of engaging design and confidential access appeared to be more important.                                                                                                                                                                                                                                                                                                                                                     |
| Lucassen et al.\(^{37}\) (New Zealand) | N=25  
(12 identified males and 13 females, with two participants’ gender identity and sex assigned at birth differing, aged 13-19)  | Interviews with LGBTQ+ youth who used a form of computerized therapy (Rainbow SPARX) for depression \[3\]. They discussed five main themes: 1. appealing aspects; 2. applying SPARX to real life; 3. things to improve; 4. aspects that did not appeal; 5. other themes. | Seventeen participants thought that computerized therapy helped them feel better or less depressed. The input of the users helps improve services. The study provides important in-depth feedback on Rainbow SPARX from the perspective of youth from sexual minorities.                                                                                                                                                                                                                   |
| Shepherd et al.\(^{39}\) (New Zealand) | N=26  
(19 taitamariki, 7 parents, all Māori)  | Seven focus groups and individual interviews with indigenous New Zealand young people (taitamariki) and their families to discover their opinions about SPARX (look and style of the game, the content, the cultural content). | The SPARX computerized therapy had good face validity for indigenous young people and their families. Indigenous families need to help them encourage and support their young people with depression when using cCBT. Learning a simple relaxation exercise (breathing/relaxation skill) was particularly beneficial.                                                                                                                                                                                                                       |
| Sundram et al.\(^{38}\) (New Zealand)  | N=50  
(Clinicians working in primary care: general practitioners (GPs), school guidance counselors, clinical psychologists, youth workers, and nurses) 
N=29  
(Adolescents, aged 12-19) | Semi-structured focus groups included clinicians who worked in primary care and adolescents. They were aimed to provide feedback in 3 phases corresponding to the consultation, development, and post-implementation stages. Themes: For clinicians: Registration system to gain access to the e-monitoring section of SPARX; Electronic linking of adolescent user data to the referring clinician; Ability to personalize the e-monitor by the adolescent; Web-based dashboard to allow clinicians to track all the adolescent users who were prescribed SPARX; an algorithm to automatically generate alerts at specific and concerning levels of depression or self-harm; etc.) | The study revealed the complexity of implementing the tool in clinical practice of salience: privacy, parallel monitoring systems, integration with existing electronic medical record systems, customization of the e-monitor, and pre-agreed monitoring arrangements between clinicians and adolescents.                                                                                                                                                                                                                       |
Table 2.

<table>
<thead>
<tr>
<th>Authors (location)</th>
<th>Participants</th>
<th>Methods</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuosmanen et al. (Ireland)</td>
<td>N=28 students (mean age 17.32 years), N=6 staff member (from six of the nine centers)</td>
<td>The students and staff moderators completed a post-intervention questionnaire. Student opinions were explored using open-ended questions, and Likert-style questions to explore five areas: engagement, ease of use, relevance, usefulness, and overall satisfaction. Clinicians' opinions were explored using five areas: student engagement, module engagement, overall satisfaction, and views on computerized delivery.</td>
<td>Most students considered SPARX-R easy to use and agreed that the program made sense. However, less than half of the participants enjoyed the program's look. Only a third (32.2%) indicated they would recommend the program to a friend. Participants reported that SPARX-R was useful for the acquisition of relaxation and cognitive restructuring skills. Staff expressed a need for increased flexibility in the delivery and complementary programs with face-to-face activities to improve student engagement.</td>
</tr>
<tr>
<td>Shepherd et al. (New Zealand)</td>
<td>N=6 (4 Māori population aged 12-19)</td>
<td>Follow-up semi-structured interviews were conducted once users had completed work with the SPARX resource. Five themes were investigated: 1) SPARX helpfulness to learn CBT skills; 2) Māori designs; 3) Characters in SPARX provided hope and help; 4) SPARX design was enjoyable and provided challenging factors; 5) SPARX booklet helped in recording participants' thoughts and feelings.</td>
<td>Adolescents reported that SPARX-R is useful for the acquisition of relaxation and cognitive restructuring skills. However, less than half of the participants enjoyed the program's look. Only a third (32.2%) indicated they would recommend the program to a friend. Adolescents in alternative education programs, including those with and those without symptoms of possible depression, considered both SPARX and SPARX-R useful and enjoyable. Participants considered both SPARX and SPARX-R useful, and the program's stated purpose to be important. Although the program's stated purpose is to be important, adolescents said they would recommend SPARX or SPARX-R to a friend. Participants considered both SPARX and SPARX-R useful, and the program’s stated purpose to be important. Although the program’s stated purpose is to be important, adolescents said they would recommend SPARX or SPARX-R to a friend. Adolescents in alternative education programs, including those with and those without symptoms of possible depression, considered both SPARX and SPARX-R useful and enjoyable. Participants considered both SPARX and SPARX-R useful, and the program’s stated purpose to be important. Although the program’s stated purpose is to be important, adolescents said they would recommend SPARX or SPARX-R to a friend.</td>
</tr>
<tr>
<td>Authors (location)</td>
<td>Suggested improvements</td>
<td>Positive opinions</td>
<td>Limitations/ disengagement</td>
</tr>
<tr>
<td>--------------------</td>
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</tr>
<tr>
<td>Fleming et al. (New Zealand)</td>
<td>1. Improved graphics and quicker action to make SPARX comparable to commercially available games. 2. More options for avatar customization and design.</td>
<td>-</td>
<td>A few young people did not want to ask their parents for consent. A small number of participants did not like computers. Someone specifically wanted to talk to someone.</td>
</tr>
<tr>
<td>Merry et al. (New Zealand)</td>
<td>Not addressed</td>
<td>Positive comments about the 'look and feel' of SPARX. Positive comments about one's ability to be gender non-conformist; and, positive feedback about the broader concept of cCBT.</td>
<td>1. Female participants identified having only a male guide character was an issue. 2. Language should be in keeping with the game setting. 3. Reading should be kept to a minimum and should not be too explicitly a 'depression game'. 4. Participants identified issues with gameplay, specifically that the mini-games are too easy.</td>
</tr>
<tr>
<td>Bobier et al. (New Zealand)</td>
<td>Not addressed</td>
<td>Not addressed</td>
<td>-</td>
</tr>
<tr>
<td>Lucassen et al. (New Zealand)</td>
<td>Not addressed</td>
<td>Not addressed</td>
<td>-</td>
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</tbody>
</table>
### Table 3.

<table>
<thead>
<tr>
<th>Authors (location)</th>
<th>Users engagement</th>
<th>Therapist’s role</th>
<th>Positive opinions</th>
<th>Limitations/ disengagement</th>
<th>Suggestions for improvement</th>
<th>Satisfaction assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheek et al. (Australia)</td>
<td>Youths and family assessment and feedback</td>
<td>Not specifically addressed</td>
<td>1. Narrative structure of the program. 2. The use of different characters and the personalization of an avatar. 3. “Socialization” with the Guide character. 4. Journaling diary. 5. Encourage feedback. 6. Engaging design and confidential access.</td>
<td>1. School setting was seen as a limit due to the fear of judgment and reprisal from peers. 2. The SPARX program might be less appealing to those who do not play computer games.</td>
<td>Computerized therapy offered in ways that support privacy and choice can improve access to treatment for rural youth. Issues of engaging design and confidential access appeared to be more important.</td>
<td>-</td>
</tr>
<tr>
<td>Lucassen et al. (New Zealand)</td>
<td>Collaboration between clinicians and youth in game development</td>
<td>Guidance counselors were identified as necessary in the rollout of the program.</td>
<td>1. Game format. 2. Look and feel. 3. Features of 6 characters. 4. “Rainbow” content. 5. Completion of challenges (cognitive behavioral therapy homework tasks) and application of skills.</td>
<td>1. Mini-games or puzzles should be more challenging. 2. Less talking or dialogue and more game play. 3. Insufficient ‘rainbow’ content. 4. The terminology about sexuality should be improved.</td>
<td>Seventeen participants thought that computerized therapy helped them feel better or less depressed. The input helps improve services. The study provides relevant, in-depth feedback on Rainbow SPARX from the perspective of sexual minority youth.</td>
<td>-</td>
</tr>
<tr>
<td>Shepherd et al. (New Zealand)</td>
<td>Youths, providers, and various Māori experts contributed to game design and development; youths included in co-design workshops.</td>
<td>cCBT programs without direct therapist input can teach skills.</td>
<td>1. Cultural relevance was considered important for the engagement. 2. Guide character as a model for the participants. Māori designs.</td>
<td>SPARX needed more activities for Māori males, and the puzzles and challenges required were more difficult. Developers should increase the use of audio rather than text.</td>
<td>The SPARX computerized therapy had good face validity for indigenous young people and their families. Indigenous families need to help them encourage and support their young people with depression when using cCBT. Learning a simple relaxation exercise (breathing/relaxation skill) was particularly beneficial.</td>
<td>-</td>
</tr>
</tbody>
</table>

(Continued)
**Table 3.**

<table>
<thead>
<tr>
<th>Authors (location)</th>
<th>Users engagement</th>
<th>Therapist’s role</th>
<th>Positive opinions</th>
<th>Limitations/disengagement</th>
<th>Suggestions for Improvement</th>
<th>Satisfaction assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleming et al. 2016 – online 2020 (New Zealand)</td>
<td>-</td>
<td>Guidance counselors are identified as important for telling about their feelings.</td>
<td>1. Narrative structure. 2. Guide character (a virtual therapist). 3. Game format.</td>
<td>Therapeutically limited (&quot;If you have other problems the computer cannot solve, you need a counselor&quot;).</td>
<td>Over 85% of participants reported that they would recommend SPARX to a friend. Adolescents in alternative education programs, including both those with and those without symptoms of possible depression, considered that SPARX cCBT: 1. Helped them, particularly with calmness and reducing anger and fighting. 2. This would likely increase the need for help from young people and adults. 3. Should be offered to all young people in alternative education and similar programs.</td>
<td>-</td>
</tr>
</tbody>
</table>
| Poppelaars et al.31 (The Netherlands) | - | Not addressed | - | 1. No cultural adjustments were made for Dutch adolescents. 2. SPARX is not comparable to commercially available games. | - | A brief-self report questionnaire monitored satisfaction of SPARX and OVK. Participants rated their liking for the two conditions in a similar way. OVK was rated as a more attractive option for adolescents and was perceived as more useful in daily life than SPARX. | (Continued)
<table>
<thead>
<tr>
<th>Authors (location)</th>
<th>Users engagement</th>
<th>Therapist’s role</th>
<th>Positive opinions</th>
<th>Limitations/ disengagement</th>
<th>Suggestions for Improvement</th>
<th>Satisfaction assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuosmanen et al. (Ireland)</td>
<td>Parent involvement in game assessment.</td>
<td>Findings indicate a need for further staff training to increase confidence in intervention delivery.</td>
<td>-</td>
<td>1. The program is boring and too easy to play, having too much talk/writing, being too slow. 2. Need for more customization. 3. The advice is too ‘hard going’ (i.e., challenging to deal with) by focusing unduly on negative aspects of mental health.</td>
<td>‘… perfect for people who are on a waiting list for counseling’.</td>
<td>A self-report questionnaire monitored satisfaction. On a scale of 1 to 10, SPARX-R received a mean overall satisfaction score of 5.78 (SD 2.79). However, more than half of the participants (53.6%) considered the program helpful for a young person going through a tough time, and only a third (32.2%) indicated that they would recommend the program to a friend. A minority (10.7%) said the program was upsetting, and a quarter (25%) stated they were worried about privacy.</td>
</tr>
<tr>
<td>Perry et al. (Australia)</td>
<td>-</td>
<td>Less teacher support.</td>
<td>-</td>
<td>1. Several technical problems. 2. Excessive load on the school information technology system associated with multiple simultaneously accessing the online research platform and downloading the SPARX-R game files. 3. Cultural issues.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sundram et al. (New Zealand)</td>
<td>Clinical and adolescent involvement in consultation and development.</td>
<td>Clinicians and adolescents suggested the need for a discussion around e-monitoring so that the adolescents knew that a clinician had oversight of their progress and could maintain the therapeutic relationship while enhancing their autonomy and sense of control.</td>
<td>-</td>
<td>Clinicians: 1. A registration system for clinicians so that they could use the SPARX e-monitoring tool. 2. Electronic linking of SPARX user data to the prescribing clinician. 3. A dashboard accessible on the Internet to allow clinicians to track all users they had referred to SPARX. 4. An algorithm to automatically generate alerts at specific and concerning levels of depression or self-harm and a system to encourage users to access more help. Adolescents: They did not want to use their social media login credentials for e-monitoring, as they valued their privacy.</td>
<td>The study revealed the complexity of implementing the tool in clinical practice. Of salience were privacy, parallel monitoring systems, integration with existing electronic medical record systems, customization of the e-monitor, and pre-agreed monitoring arrangements between clinicians and adolescents.</td>
<td>-</td>
</tr>
</tbody>
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(Continued)
5. A system to deliver alerts or “flags” via e-mail to the clinician.

**Adolescents:**
6. Most participants were positive and supportive of the idea of adding e-monitoring to enhance the effectiveness.
7. SPARX Booklet (daily diary) helped record participants’ thoughts and feelings.

<table>
<thead>
<tr>
<th>Authors (location)</th>
<th>Users engagement</th>
<th>Therapist’s role</th>
<th>Positive opinions</th>
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<th>Suggestions for Improvement</th>
<th>Satisfaction assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuosmanen et al. (Ireland)</td>
<td>Staff</td>
<td>Staff expressed a need for increased flexibility in delivery and complementing computerized programs with face-to-face activities to improve student engagement.</td>
<td>-</td>
<td>Modules were too long, and the program was a lot of work and too slow. Worried about privacy. Too easy to play. Having too much talk/ writing. The need for more customization. The program focuses on the negative aspects of mental health. Technical issues (the game freezing or not saving progress) and limitations in design or gaming (graphics not being up to date, the character moving or reacting slowly, and lack of instructions).</td>
<td>Most students considered SPARX-R easy to use and agreed that the program made sense. However, less than half of the participants liked the program’s look. Only a third (32.2%) indicated they would recommend the program to a friend. Those categorized as at risk for depression rated the program higher in relevance and usefulness than those with no symptoms or clinical symptoms of depression.</td>
<td>A brief self-report questionnaire monitored the satisfaction of the staff. 1. The game is fun and easy to learn from. 2. Customizing your avatar. 3. Completing challenges.</td>
</tr>
<tr>
<td>Authors (location)</td>
<td>Users engagement</td>
<td>Therapist’s role</td>
<td>Positive opinions</td>
<td>Limitations/ disengagement</td>
<td>Suggestions for Improvement</td>
<td>Satisfaction assessment</td>
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</tr>
<tr>
<td>Shepherd et al., 40 (New Zealand)</td>
<td>-</td>
<td>Not addressed.</td>
<td>1. Customize the SPARX characters with Māori designs. 2. The SPARX Booklet (daily diary) helped record participants’ thoughts and feelings.</td>
<td>Participants found the puzzles to be difficult.</td>
<td>1. Taitamariki adolescents reported the acquisition of relaxation and cognitive restructuring skills. 2. Improved mood and increased levels of hope for the participants. 3. In some instances, SPARX was used by broader family members with reported beneficial effects (family health).</td>
<td>-</td>
</tr>
<tr>
<td>Fleming et al., 41 (New Zealand)</td>
<td>-</td>
<td>The absence of a therapist generates less embarrassment among the participants.</td>
<td>1. “Universality” reflects preferences for a universal approach as young people (SPARX-R). 2. Validating a young person’s depressive experiences (SPARX).</td>
<td>Naming depression is risky because it could be “a little bit scary” (SPARX).</td>
<td>Participants considered both SPARX and SPARX-R useful and considered the stated purpose of the program to be important. Preference for both options to be offered, allowing user choice.</td>
<td>-</td>
</tr>
<tr>
<td>Lucassen et al., 27 (New Zealand)</td>
<td>-</td>
<td>Not addressed</td>
<td>-</td>
<td>The forced gender binary is inherent in the program. Transgender had high mental health needs.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lucassen et al., 26 (New Zealand)</td>
<td>-</td>
<td>Not addressed</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bohr et al., 30 (Canada, Inuit population)</td>
<td>Māori Taitamariki in design</td>
<td>-</td>
<td>Māori identity</td>
<td>The puzzles and challenges within SPARX were too easy.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 4. Completion of treatment, drop-out rates, and reasons for discontinuation.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Completion module 1</th>
<th>module 2</th>
<th>3 module</th>
<th>4 module</th>
<th>5 module</th>
<th>6 module</th>
<th>Completed SPARX (%)</th>
<th>Drop-outs/SPARX users (%)</th>
<th>Reasons for discontinuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleming et al.²²</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>26 (81%)</td>
<td>-</td>
<td>22 (69%)</td>
<td>10/32 (31%)</td>
<td>Running out of time in the classroom.</td>
<td></td>
</tr>
<tr>
<td>Merry et al.²³</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>69 out of 80 (86%)</td>
<td>-</td>
<td>-</td>
<td>48 out of 80 (60%)</td>
<td>9/94 (9%)</td>
<td>Worsening of depressive symptoms and transition to more frequent face-to-face interventions; technical glitches, lack of time, lack of interest, not finding the resource helpful, being physically unwell, and unable to attend appointments.</td>
</tr>
<tr>
<td>Bobier et al.²⁴</td>
<td>8 (40%)</td>
<td>3 (15%)</td>
<td>3 (15%)</td>
<td>1 (5%)</td>
<td>1 (5%)</td>
<td>2 (10%)</td>
<td>2 (10%)</td>
<td>18/20 (90%)</td>
<td>Lack of interest, lack of perceived utility, and lack of prompting by staff.</td>
</tr>
<tr>
<td>Poppelaars et al.³¹</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>38 (74.5%)</td>
<td>13/51 (25.5%)</td>
<td>Unwilling to play SPARX.</td>
</tr>
<tr>
<td>Perry et al.²⁸</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>142 (58.6%)</td>
<td>-</td>
<td>-</td>
<td>100/242 (41.4%)</td>
<td>Differences in motivation. Several technical problems occurred during implementation (particularly in schools allocated to the SPARX-R intervention).</td>
<td></td>
</tr>
<tr>
<td>Kuosmanen et al.²⁹</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>26 (87%)</td>
<td></td>
<td></td>
<td>9/30 (30%)</td>
<td>21/30 (70%)</td>
<td>The program was rated as the least helpful in terms of changing behavior.</td>
</tr>
</tbody>
</table>

(Continued)
### Table 4.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Completion</th>
<th>module 2</th>
<th>3 module</th>
<th>4 module</th>
<th>5 module</th>
<th>6 module</th>
<th>Completed SPARX</th>
<th>Drop-outs/SPARX users (%)</th>
<th>Reasons for discontinuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleming et al.²⁵</td>
<td></td>
<td>2 (10%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>7/19 (37%)</td>
<td>Two users reported that they did not like the SPARX-R program. 'It was not my thing' and 'I felt babyish'; 'It was too much talking'. Getting a private space and time on the laptop was tricky. The computer program was slow to load, and some had difficulties saving progress. The program had low technical quality and was much slower than playing games. Users arrested, court-ordered residence change, or early discharge.</td>
</tr>
<tr>
<td>Lucassen et al.²⁷</td>
<td>Transgender (n=207)</td>
<td>111 (53.6%)</td>
<td>Transgender 99 (47.8%)</td>
<td>Transgender 12 (5.8%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8.742/9.079 (96.3%)</td>
<td></td>
</tr>
</tbody>
</table>