

Reducing social anxiety in adolescents distressed by a visible difference: Results from a randomised control trial of a web-based intervention[☆]



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ABSTRACT

A visible difference to the face or body may challenge adolescents' adjustment and engagement in life activities, where some require psychosocial support. However, evidence is limited for whether existing interventions for this adolescent group reduce social or appearance-related distress. We therefore conducted a parallel-group, randomised control trial to evaluate the effectiveness of Young Person's Face IT, a self-guided web-based psychosocial intervention developed for adolescents with a visible difference who experience distress. Adolescents ($N = 189$, aged 11–18) from two countries (Norway and the Netherlands), were randomly allocated to an intervention group or care as usual (CAU). Outcomes were body esteem, social anxiety, perceived stigmatisation, and life disengagement. Compared with CAU, participants who completed Young Person's Face IT showed reductions in social anxiety symptoms ($\eta_p^2 = 0.06$). No significant improvements were found for the other outcomes. This study endorses web-based psychosocial support in reducing social anxiety in adolescents distressed by a visible difference. Future studies are needed to confirm the effectiveness of Young Person's Face IT and to explore potential long-term effects.

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1. Introduction

1.1. Living with a visible difference

Having a sense of normality and belonging is central to the psychological well-being of all individuals, and is especially important during adolescence. A visible facial or bodily difference can therefore have a profound psychological impact (Ablett & Thompson, 2016; Feragen & Stock, 2017) irrespective of the type of visible difference (Griffiths, Williamson, & Rumsey, 2012).

Approximately one in 44 people live with a visible difference that deviates from the norm and is considered socially undesirable (Changing Faces, 2010). A visible difference can be congenital or acquired, and includes a range of different conditions (Rumsey & Harcourt, 2007). Congenital differences include craniofacial conditions (e.g. cleft lip and palate or craniosynostoses) and skin conditions (e.g. epidermolysis bullosa or ichthyosis). Acquired visible differences can result from accidental traumas (e.g. burn scars or injuries from traffic accidents), disease (e.g. meningitis), or medical interventions (e.g. hair loss from chemotherapy or scars).

Previous studies suggest that the presence of a visible difference increases adolescents' risk of low self-esteem (Tiemens, Nicholas, & Forrest, 2013) and particularly of developing anxiety (van Dalen et al., 2020), and increases concerns regarding the chances of being involved in romantic relationships (Griffiths et al., 2012). Adolescents who are worried or dissatisfied with their appearance may also experience challenges in peer relationships (Shapiro, Waljee, Ranganathan, Buchman, & Warschausky, 2015), fear of negative evaluations (Griffiths et al., 2012), and reduce their engagement in different life activities, such as school attendance, sports, and socialising with friends (Atkinson & Diedrichs, 2021). Many adolescents also encounter stigmatising experiences or intrusive behaviours (e.g. teasing, bullying, staring, or unwanted questioning and attention from others) (Tiemens et al., 2013), which have been linked to reduced psychological adjustment and health-related quality of life (Masnari et al., 2013).

The timing of negative social experiences seems to be particularly influential. Feragen and Stock (2016) found that experiences of teasing after the age of 10, and measured again at age 16, predicted lower appearance satisfaction and higher levels of depressive symptoms in adolescents with visible differences. Considering that many adolescents also become increasingly invested in and self-conscious about their appearance (Knauss, Paxton, & Alsaker, 2007; Gattario & Frisé, 2019), looking different can become especially challenging during this developmental phase. A gender difference also exists, in adolescents with or without a visible difference, where adolescent girls consistently report higher dissatisfaction with their appearance or lower appearance esteem than boys (Feragen & Borge, 2010; Frisé, Lunde, & Berg, 2015). Levels of social anxiety have also been shown to be higher in adolescent girls with or without a visible difference compared to boys (Berk, Cooper, Liu, & Marazita, 2001; Ohannessian, Milan, & Vannucci, 2017).

While some adolescents manage to cope by acknowledging and accepting their situation (Egan, Harcourt, Rumsey, & Appearance Research Collaboration, 2011), others adjust to the consequences of being visibly different by employing techniques to conceal their difference (Williamson, Harcourt, Halliwell, Frith, & Wallace, 2010). Psychological adjustment appears to be more strongly related to subjective appearance perceptions rather than objective appearance ratings (Moss, 2005). Social experiences may also act as a contributing factor, where close friendships and social acceptance can positively influence adolescents' adjustment (Feragen, Kvalem, Rumsey, & Borge, 2010). In other words, positive social experiences, including close relationships with peers, may improve adolescents' adjustment to and buffer against the impact of negative influences and social stigma (Feragen et al., 2010; Tiemens et al., 2013).

In contrast, some social experiences may make adolescents with a visible difference more vulnerable and put an additional strain on their psychological well-being (Stock & Feragen, 2016). More recently, the COVID-19 pandemic presented new and unique challenges and studies have shown that social anxiety levels increased during the pandemic in adolescent community samples (Hawes, Szenczy, Klein, Hajcak, & Nelson, 2021). Research on how COVID-19 may have affected the lives of adolescents with a visible difference in particular is still scarce. For some, wearing face coverings may have been difficult because it provoked a feeling of identity loss, whereas

others may have felt relief by being able to cover their visible difference (Changing Faces, 2021). Also, for some, the pandemic may have worked to provide a temporary relief from social pressure (Harcourt, Tollow, Hamlet, Zucchelli, & Williamson, 2021).

1.2. Interventions and support

Evidence-based interventions and support alternatives that could help adolescents develop effective coping strategies and strengthen psychological well-being may be of central importance in the process of adjusting to a visible difference. However, evidence for the short- and long-term effectiveness of existing interventions for adolescents who experience appearance-related distress is scarce (Jenkinson, Williamson, Byron-Daniel, & Moss, 2015). Several methodological issues need to be taken into account, such as small sample sizes and lack of experimental designs (Jenkinson et al., 2015). Moreover, existing interventions have mainly included samples of adults with visible differences when testing the effectiveness of psychosocial interventions (Norman & Moss, 2015). Evidence-based interventions tailored specifically for adolescents with visible differences are therefore needed.

Some psychosocial approaches and therapeutic techniques have shown promise in supporting adolescents with visible differences. Evidence-based approaches are Social Skills Training (SST; Blakeney et al., 2005; Pell, 2019) and SST in combination with Cognitive Behaviour Therapy (CBT; Maddern, Cadogan, & Emerson, 2006). Blakeney et al. (2005) evaluated an SST-based intervention workshop with English-speaking adolescents with burn injuries ($N = 64$). Compared to controls, participants reported less withdrawal from social situations and fewer behavioural problems one year after the intervention. However, the study was limited by a relatively small sample size, and could have been strengthened by including a broader set of measures. Pell (2019) also evaluated an SST-based workshop in the United States, in this case attended by parents of children with craniofacial conditions, adults with burn injuries, and individuals' with skin conditions ($N = 46$). After completing the workshop, participants felt better prepared to cope with negative social experiences such as staring (Pell, 2019). The study was however descriptive in nature and limited by the lack of a control group, a relatively small sample size, and did not include pre- and post-intervention measurements (Pell, 2019).

Maddern et al. (2006) evaluated an intervention based on a combination of SST and CBT with adolescents with craniofacial and scarring conditions living in England. After completing the intervention, participants ($N = 29$) reported fewer experiences of teasing and felt less distressed by actual teasing, and parents reported a reduction in anxiety levels. Again, this study was limited by the lack of a control group and a small sample size (Maddern et al., 2006). Residential social camps have also shown potential in positively affecting appearance satisfaction and perceptions of stigmatising behaviours among adolescents with a visible difference living in the United Kingdom, as was demonstrated in the study by Armstrong-James, Cadogan, Williamson, Rumsey, and Harcourt (2018). Although the study included pre- and follow-up measurements, a high level of attrition at follow-up and lack of a control group limits the interpretation of results (Armstrong-James et al., 2018).

Evidently, interventional techniques such as SST and/or CBT techniques may assist adolescents in strengthening coping mechanisms when dealing with difficult situations, and recognising and changing negative thoughts and feelings about their own appearance (Blakeney et al., 2005; Maddern et al., 2006; Jenkinson et al., 2015). Having good social skills may also benefit adolescents in several ways, such as being rated more positively by others and being perceived as more social and confident (Edwards, Topolski, Kapp-Simon, Aspinall, & Patrick, 2011). In summary, promising results regarding the usefulness of SST and/or CBT approaches need to

be tested with more robust methodology, such as large-scale randomised control trials (RCT), in order to build stronger evidence for their effectiveness in strengthening coping in adolescents with a visible difference.

1.3. Web-based psychosocial support

Despite research showing the potential psychological benefit of SST and CBT-based interventions for adolescents with a visible difference, the general availability of psychological treatment and interventions for these adolescents is limited (Harcourt et al., 2018). Local health care systems may have few psychologists with clinical expertise in appearance psychology and related to living with a visible difference in many countries, combined with geographic and demographic characteristics that may contribute to make specialised psychological treatment difficult to reach (Harcourt et al., 2018). Given the variation in accessibility of appearance-related care, research needs to address the potential benefits of alternative ways of delivering interventions and reaching adolescents in need for support.

Increasing evidence points to Internet-delivered Cognitive Behaviour Therapy (ICBT) as being potentially effective in treating psychological difficulties such as anxiety and depression (National Institute for Health and Clinical Excellence, NICE, 2005; Nordgreen, Gjestad, Andersson, Carlbring, & Havik, 2018). For instance, a recent review and meta-analysis (Carlbring, Andersson, Cuijpers, Riper, & Hedman-Lagerlöf, 2018), has suggested that guided ICBT in many instances is equally effective as standard face-to-face CBT in treating social anxiety and depression in adults. ICBT has also shown promise in adolescent community samples in reducing symptoms of anxiety (Stjerneklar, Hougaard, McLellan, & Thastum, 2019) and depression (Topooco et al., 2019), and negative body image (Franko, Cousineau, Rodgers, & Roehrig, 2013; Rodgers et al., 2018). Stjerneklar et al. (2019) randomised adolescents with anxiety disorders ($N=70$) to a 14-week guided ICBT or to a waitlist group. Adolescents who completed the ICBT programme showed significant improvements in their anxiety symptoms post-intervention, compared with the waitlist group. In the study by Topooco et al. (2019), adolescents with depressive symptoms ($N=70$) were also randomised to an 8-week guided ICBT or to a control group, with those receiving ICBT showing significant improvements in their symptom levels.

Web-based support has also improved body image perceptions in older adolescents (Franko et al., 2013; Rodgers et al., 2018). Franko et al. (2013) and Rodgers et al. (2018) evaluated BodiMojo, an unguided intervention to promote positive body image. In both studies, adolescents from community settings were randomised to an intervention group that received BodiMojo or a control group. Adolescents in the intervention group showed improved body image (Franko et al., 2013) and appearance esteem (Rodgers et al., 2018). Collectively, results from these intervention studies are encouraging. It is also noteworthy that, since the rise of COVID-19, there has been an increased demand for ICBT-based approaches, which has proved to be effective in reducing anxiety and depression in adults during the pandemic (Mahoney, Li, Haskelberg, Millard, & Newby, 2021).

Little is currently known about the effectiveness of ICBT-interventions specifically developed for individuals with a condition affecting their appearance. Previous studies have indicated that adolescents may find it difficult to raise appearance concerns face-to-face with healthcare professionals (Williamson et al., 2010), and may prefer more easily accessible support that offers a greater degree of anonymity and confidentiality when discussing appearance issues (Griffiths et al., 2012). ICBT-based approaches have the potential to fulfil this need, including in extraordinary times where pandemics such as COVID-19 may cause lockdowns and inhibit access to support due to social distancing (Mahoney et al., 2021).

1.4. The Young Person's Face IT (YPF) intervention

One self-guided web-based intervention, Face IT, for adults with a visible difference and integrating SST and CBT approaches, was developed and evaluated via a RCT by researchers at the Centre for Appearance Research at the University of the West of England, Bristol, UK. Compared with controls, the trial demonstrated that standard face-to-face intervention and Face IT equally reduced anxiety, fear of negative evaluations, depressive symptoms, and appearance-related distress (Bessell et al., 2012).

Based on evidence of Face IT's effectiveness among adults with a visible difference (Bessell et al., 2012; Norman & Moss, 2015), a similar self-guided intervention for adolescents, Young Person's Face IT (YPF), was developed by researchers at the Centre for Appearance Research, in close collaboration with adolescents with visible differences, their parents, and clinical experts and health professionals (Williamson et al., 2016). The therapeutic content of YPF is based on the adult version, Face IT (Bessell et al., 2012), and consists of seven weekly sessions and one booster session completed six weeks later to maintain therapeutic effect (Williamson et al., 2016). Each session takes around 30–40 min to complete and participants are encouraged to work through YPF independently, although they may also ask for advice and guidance from others (e.g. parents/primary caregivers) if needed. Each session provides advice and guidance in written, audio, and video formats, and focuses on teaching and encouraging adolescents to practice strategies such as managing staring, bullying, and anxiety, through interactive and homework activities (Williamson et al., 2016). A detailed description of the intervention content is published elsewhere (see Williamson et al., 2016). Additionally, participants can record their own reflections and experiences in their YPF diary. To support participants who may struggle with reading, audio recordings for all written text are available on the English and Norwegian YPF intervention website.

The feasibility and acceptability of YPF has been explored in several studies across the world (Feragen, 2017; Gee, Williamson, Maskell, Kimble, & Newcombe, 2018; Williamson et al., 2019; Riobueno-Naylor et al., 2019; 2021; van Dalen et al., 2021), and the programme therefore exists in English (<https://www.yppfaceit.co.uk>), Norwegian (<https://www.ungfaceit.no/>) and Dutch (<https://www.faceitvoorjongeren.nl/>). The British study by Williamson et al. (2019) was a feasibility trial that delivered YPF online to adolescents with a wide range of appearance-affecting conditions, and found YPF to be a safe and acceptable programme and demonstrated preliminary results indicating that the intervention could improve body esteem and reduce social anxiety (Williamson et al., 2019). The studies by Riobueno-Naylor et al. (2019, 2021) included adolescents with burns and aimed to explore the feasibility of incorporating YPF into routine outpatient paediatric burn care in the United States. Although adolescents expressed interest in using YPF, few engaged actively with the programme, and the authors concluded that more knowledge is needed on how adolescents' engagement with the intervention can be supported (Riobueno-Naylor et al., 2021).

In summary, YPF may potentially provide a cost-effective alternative to traditional face-to-face psychological treatment for adolescents that experience appearance-related distress as a result of their visible difference, and be easily accessed by adolescents in need of relevant support, irrespective of their geographical location (Williamson, Griffiths, & Harcourt, 2015). Several studies also suggest that the intervention is a safe, relevant, and acceptable tool (Feragen, 2017; Williamson et al., 2019; Riobueno-Naylor et al., 2021; van Dalen et al., 2021). However, no previous studies on YPF have moved beyond exploring the feasibility and acceptability of the intervention with larger sample sizes. Hence, one of the main limitations of the previous research on YPF was the lack of a full-scale RCT to evaluate the effectiveness of the intervention. RCTs evaluating YPF in other languages than English are also lacking. Informed by

previous research on YPF, the primary purpose of the present study was therefore to strengthen the evaluation of the intervention, with the intention of filling the existing gap in the availability of evidence-based support for adolescents with visible differences.

1.5. Aim

The aim of the current study was to evaluate the effectiveness of YPF compared with care as usual (CAU) in improving psychological well-being in adolescent with a visible difference living in Norway and the Netherlands. We had three specific aims:

- 1) Examine whether YPF improves body esteem and/or reduces social anxiety compared with CAU (primary outcomes).
- 2) Examine whether YPF reduces perceived stigmatisation and/or life disengagement compared with CAU (secondary outcomes).
- 3) Explore variables that could potentially influence post-intervention outcome scores for the intervention group. We therefore examined whether age, gender, country, time spent on YPF, and/or type of visible difference, predict changes in body esteem, social anxiety, perceived stigmatisation, and life disengagement, when controlling for baseline outcome scores.

2. Method

2.1. Trial design

This study was a parallel-group RCT. Participants were recruited from two independent studies conducted in two countries (i.e. Norway and the Netherlands) and the samples were merged for the present study. Participants were allocated to either an intervention group (YPF) or a control group receiving CAU, and completed outcome measures prior to randomisation (baseline assessment) and thirteen weeks later (post-intervention assessment). The Norwegian study was reviewed by the Regional Committee for Medical Research Ethics (Health Region South-East, reference no.: 2015/2440) and accepted by the Data Protection Office based at Oslo University Hospital. For the study in the Netherlands, approval was obtained from the Medical Research Ethics Committee in Rotterdam, Netherlands (Reference no.: MEC-2018-052/NL63955.078.18). This trial followed the CONSORT 2010 guidelines (Schulz, Altman, & Moher, 2010).

2.2. Recruitment and procedure

In Norway, participants were recruited between April 2019 and February 2021 nationwide from University Hospitals, specialist treatment units, local healthcare services, patient organisations, and through social media (see Kling, Nordgreen, Kvale, Williamson, & Feragen, 2021). In the Netherlands, participants were recruited between August 2019 and October 2020 from a University/City hospital and nationwide through patient organisations, and through social media. In both countries, participants were recruited before, during, and after lockdowns and/or restrictions following from COVID-19.

Participants and/or participants' parents/primary caregivers contacted the research team by telephone or email if they wished to participate in the study. Following initial contact, all participants (and/or parents if adolescent < 16 years) were contacted via telephone by the research team, and answered questions in order to confirm eligibility. Inclusion criteria were: 1) age between approximately 12–17 years with a visible difference and self-identified appearance-related distress, teasing or bullying; 2) access to the internet and a home computer or tablet; 3) minimum reading level corresponding to that of a 12-year-old; 4) normal or corrected-to-normal vision. Exclusion criteria were: 1) a diagnosis of clinical depression, psychosis, eating disorder (see details below for differences

in assessment procedures between the two participating countries), and post-traumatic stress disorder (PTSD), or within 12 months of traumatic injury; 2) learning disabilities that would impede understanding of the intervention content; 3) currently receiving any psychological face-to-face intervention (e.g. therapist-delivered CBT). In order to protect potentially vulnerable participants and given the research team's limited ability to provide extended psychological support to those in need, exclusion criteria 1) and 2) were employed as to exclude participants requiring more intensive face-to-face interventions (Williamson et al., 2015). Ultimately, YPF constitutes an addition to existing support for adolescents with appearance-related distress and is not intended to replace psychological face-to-face treatment when needed (Williamson et al., 2015). Exclusion criterion 3) was employed to eliminate any influences that could impede interpretation of intervention effects resulting from YPF.

After assessing participants for inclusion and exclusion criteria, informed consents were obtained from eligible participants. For participants < 16 years, consents were also obtained from both parents/primary caregivers, and only from the participants if they were 16 years or older. After consent forms were obtained, baseline outcome measures were administered through secure online data collection platforms, accepted by the University Hospitals in Norway and the Netherlands. Participants also provided demographic information (e.g. birth date, gender, type of visible difference, and parental occupation/education) either during the screening conversations and/or as part of the baseline assessment. Consecutively, participants in both countries were randomised to either the intervention group or CAU in a 1:1 ratio, and were informed about their group allocation either by telephone or by email. Participants in the intervention group were informed about the outcome measures they would be asked to complete and given verbal instructions on how to access YPF, whereas participants in the CAU group were only informed about the outcome measures.

As the studies in Norway and in the Netherlands were developed independently, there were some differences in procedures between the two study sites: 1) In Norway, a single randomisation procedure was performed by the first author using envelopes containing a random sequence and research team members were not blinded to the randomisation. In the Netherlands, randomisation was performed using a computer generated list with a random sequence, where research team members were blinded to the randomisation, and was stratified by age (12–13, 14–15 or 16–17 years); 2) Participants living in the Netherlands were screened for subclinical symptoms of low body esteem, social anxiety, and depression, using questionnaires at baseline (see the section on assessment for details about the screening), and only randomised in cases of subclinical symptoms. This screening was performed in order to offer YPF to adolescents at the worrying end of these scales, as suggested to be beneficial by previous research (Williamson et al., 2019). In contrast, participants living in Norway were not screened for subclinical symptoms and all those that fulfilled the inclusion criteria were enrolled in the trial; 3) Although participants from both Norway and the Netherlands were randomised either to an intervention group or CAU, there were some differences between the CAU groups in the two countries. In Norway, a waiting list CAU group was used. Participants randomised to this group knew that they would wait three months before they would receive access to the intervention, and complete a new set of outcome measures after completion of YPF for the purpose of the larger Norwegian RCT study. In the Netherlands, participants randomised to CAU were offered access to the intervention after participation in the study (after final completion of outcome measures at six months). However, adolescents choosing to do so were not included in a follow-up study; 4) In Norway, progress with YPF was followed-up by a research team member; 5) All participants were offered incentives for completing outcome measures.

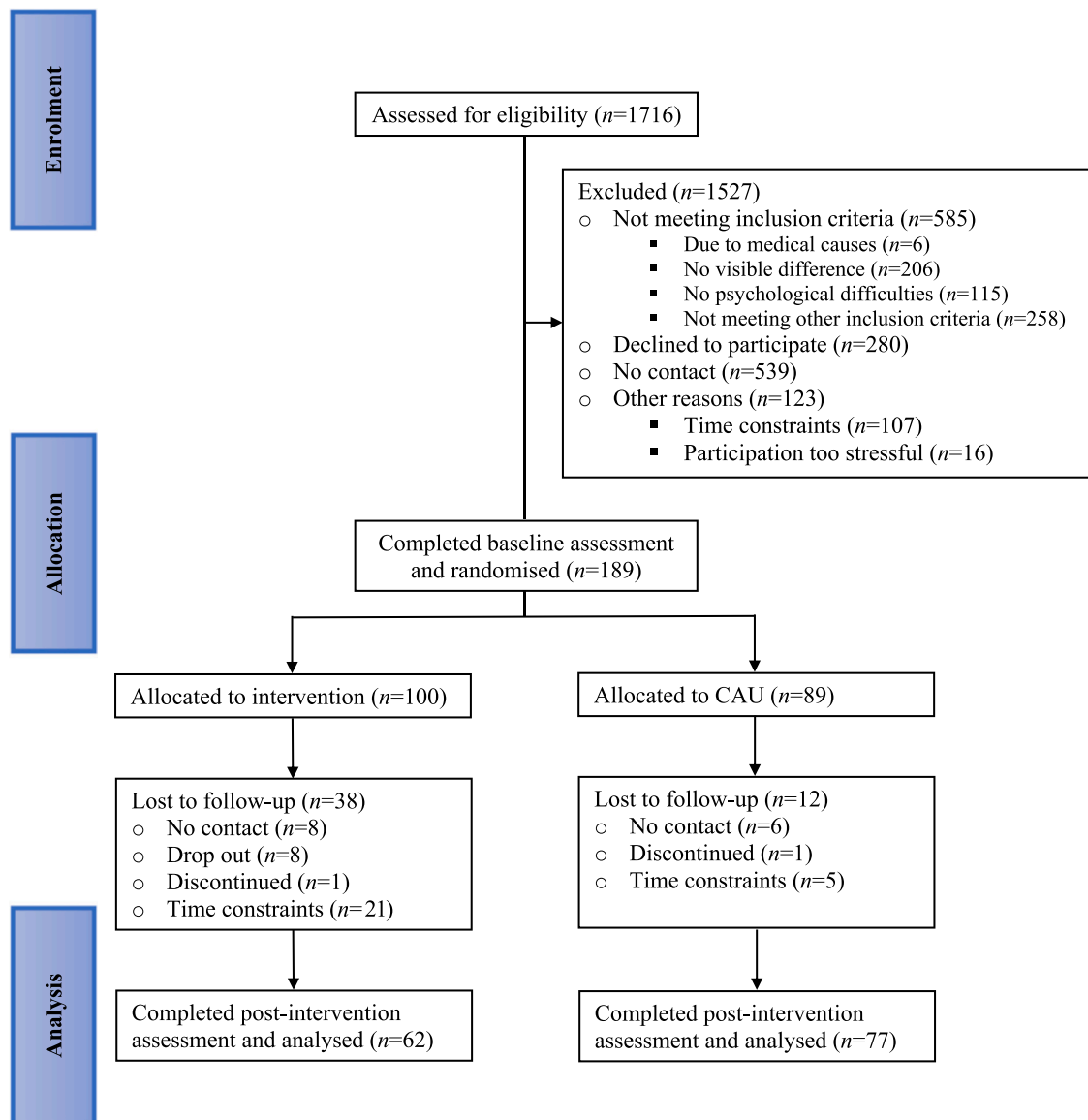


Fig. 1. Flow chart of study procedures. BESAA = Body-Esteem Scale for Adolescents and Adults; SAS-A = Social Anxiety Scale for Adolescents; CDI-2 = Child Depression Inventory 2 (Kovacs, 2016). Only participants living in the Netherlands were screened for subclinical symptoms of low body esteem, social anxiety, and depression at baseline and before randomisation. All randomised participants ($N = 189$) were included in intention-to-treat (ITT) analyses.

In line with standard recommendations provided by the ethics committees in both countries, participants living in Norway received a €30 gift card for completion of the post-intervention measure and participants living in the Netherlands received a €10 gift card after study completion.

2.3. Participants

A total of 1716 participants were assessed for eligibility. After screening, 1527 were excluded (see Fig. 1). The final study sample consisted of 189 participants randomised to the intervention group ($n = 100$) or CAU ($n = 89$). An a priori sample size calculation revealed that 62 participants were needed per group to achieve at least 80% for detecting treatment effects when a Cohen's d effect size of .50 was considered to represent a clinically meaningful effect (Norman, Sloan, & Wyrwich, 2003). Therefore, this study was considered sufficiently powered to detect statistically significant results.

2.4. Intervention (YPF)

Participants in the intervention group received a username and password to access YPF and completed the intervention on a computer or tablet at home or another self-selected location. During the course of the programme, some adolescents contacted the research team because they needed technical support with logging in to the intervention website, support with changing passwords, or because of technical issues with the intervention website. No participants or parents contacted the research team because of concerns related to psychological well-being, or because they wished referral to the healthcare system.

2.5. CAU

All participants received CAU, with those in the intervention arm also receiving YPF. However, none of the two participating countries offer standardised psychosocial or psychological treatment for adolescents with a visible difference, and CAU would therefore vary according to needs, resources, and expertise within local health care

services. CAU could for example include routine consultations at the hospital for medical treatment of skin conditions, such as eczema or other type of congenital conditions.

2.6. Assessment

2.6.1. Primary outcomes

2.6.1.1. Body esteem. To assess body esteem, the Appearance Esteem Subscale (BE-Appearence) of the Body-Esteem Scale for Adolescents and Adults (BESAA; Mendelson, Mendelson, & White, 2001) was used. This subscale contains ten items rated on a five-point Likert scale from 0 (*never*) to 4 (*always*). Statements include “I worry about the way I look” and “I like what I see when I look in the mirror”. After negatively worded items have been reversed, higher mean values indicate greater appearance satisfaction (Mendelson et al., 2001). Good internal consistency of the BE-Appearence Subscale has been demonstrated in a community sample of adolescents (Nelson, Kling, Wängqvist, Frisén, & Syed, 2018), as well as for all three subscale of the BESAA with adolescents with a visible difference (Lawrence, Rosenberg, Mason, & Fauerbach, 2011). In this study, Cronbach's alpha was $\alpha = .91$ for the total sample.

2.6.1.2. Social anxiety. The Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998) was used to assess subjective experiences of social anxiety. SAS-A contains 18 descriptive self-statements divided into three subscales, with items rated on a five-point scale ranging from 1 (*never*) to 5 (*always*). All subscales were used in the present study. The first subscale, Fear of Negative Evaluation (FNE), contains eight items (e.g. “I worry about what other kids think about me”). The second subscale, Social Avoidance and Distress Specific to New Situations or Unfamiliar Peers (SAD-New), includes six items (e.g. “I get nervous when I meet new kids”). The third subscale, Social Avoidance and Distress in General (SAD-General), contains four items (e.g. “I feel shy even with kids I know well”). Higher scores indicate higher levels of social anxiety (La Greca & Lopez, 1998). Good psychometric properties of the SAS-A have been demonstrated in a Finnish adolescent community sample (Ranta et al., 2012). In this study, Cronbach's alpha was high for all subscales (FNE, $\alpha = .91$; SAD-New, $\alpha = .86$; SAD-General, $\alpha = .78$) and high for the overall scale ($\alpha = .93$).

2.6.2. Secondary outcomes

2.6.2.1. Perceived stigmatisation. The Perceived Stigmatization Questionnaire (PSQ; Lawrence, Fauerbach, Heinberg, Doctor, & Thombs, 2006) was used to evaluate participants' perceptions of stigmatisation behaviours. PSQ consists of 21 items, divided into three subscales, that are rated on a five-point Likert scale from 1 (*never*) to 5 (*always*). All subscales were used in the present study. The subscales evaluate the Absence of Friendly Behaviour (AFB), Experiences of Confused and Staring Behaviours from Others (CSB), and the extent to which respondents encounter Hostile Behaviour (HB). Example of items include, “People are relaxed around me”, “People avoid looking at me”, and “People call me names”. After reversing positively worded items, higher scores indicate higher levels of perceived stigmatisation. Acceptable psychometric properties have been demonstrated for the PSQ with children and adolescents with a visible difference (Lawrence, Rosenberg, Rimmer, Thombs, & Fauerbach, 2010). The PSQ has also previously been translated and used with Dutch adults with burn injuries (Willemse, Geenen, & Van Loey, 2021). In this study, Cronbach's alpha was acceptable for two of the subscales (AFB, $\alpha = .79$; CSB, $\alpha = .75$), and good for the third subscale (HB, $\alpha = .90$) and the overall scale ($\alpha = .88$).

2.6.2.2. Life disengagement. The Body Image Life Disengagement Questionnaire (BILD-Q) (Diedrichs et al., 2016; Atkinson & Diedrichs, 2021) was used to measure the extent to which

adolescents' worries and negative feelings directed towards their appearance impact engagement or intention to engage in different life activities (e.g. “going to a social event” and “giving an opinion”). The current BILD-Q (Atkinson & Diedrichs, 2021) consists of nine items rated on a four-point Likert scale from 1 (“Hasn't stopped me at all”) to 4 (“Stopped me all the time”). However, a previous ten-item version of the BILD-Q was used in the present study (Diedrichs et al., 2016). Higher scores reflect greater life disengagement. Acceptable psychometric properties of the BILD-Q have been demonstrated in an adolescent community sample (Atkinson & Diedrichs, 2021). In this study, Cronbach's alpha was good ($\alpha = .83$).

2.6.3. Screening measures

In the Netherlands, screening for subclinical symptoms of low body esteem, social anxiety, and depression, was carried out using BESAA, SAS-A and the Child Depression Inventory 2 (CDI-2; Kovacs, 2016). For SAS-A, 0.5–2 standard deviations above average was used as a cut-off value (Inderbitzen-Nolan & Walters, 2000). The same approach was used for BESAA (i.e. 0.5–2 standard deviations under average). For the CDI-2, the 70th and 90th percentile was used as a cut-off value (Kovacs, 2016). Participants that showed subclinical symptoms on one or several of these measures were included in the study and subsequently randomised.

2.6.4. Translations

BESAA, SAS-A, PSQ, and BILD-Q did not exist in Norwegian and were translated, and only BILD-Q had to be translated to Dutch. The translation of BILD-Q to Dutch was performed by the second author and double-checked by the last author, both of which are native speakers of Dutch. Back-translations were performed for all measures following recommended procedures (Brislin, 1970), except for the translations of BILD-Q to Norwegian and to Dutch.

2.7. Statistical analysis

Data were analysed using the IBM Statistical Package for the Social Sciences Software (SPSS, version 26). First, data were screened for outliers and distribution of data that may have violated assumptions of the statistical analysis. No outliers were found that could impede analyses and data quality was considered satisfactory for the main analyses. Due to human error, one item in the PSQ (i.e. “People are nice to me”) was omitted in the Norwegian version. This error was taken into account when calculating the AFB subscale and total scale. An independent samples t-test was used to assess differences in age between the intervention group and CAU.

To test research questions 1) and 2), whether YPF improves body esteem, and reduces social anxiety, perceived stigmatisation, and life disengagement, a series of ANCOVA's were conducted for each outcome. Group allocation (i.e. intervention or CAU) was used as the independent variable and baseline scores on the outcome measures and country (defined as Norway or the Netherlands) were used as covariates. Effect sizes (partial eta squared; η_p^2) were interpreted using Cohen's (1988) guidelines for small ($\eta_p^2 = .01$), moderate ($\eta_p^2 = .06$), and large ($\eta_p^2 = .14$) effects. To test research question 3), whether gender, age, country, time spent on YPF, and/or type of visible difference, predict post-intervention body esteem, social anxiety, perceived stigmatisation and/or life disengagement for the intervention group only, four separate hierarchical multiple regressions were conducted. Post-intervention outcome scores were used as dependent variables. In Step 1, we entered baseline scores of the respective outcomes. In Step 2, we entered gender, age, country, time spent on YPF, and type of visible difference. The hierarchical multiple regression models were evaluated using R^2 , adjusted R^2 (R^2_{adj}), and R^2 change (ΔR^2).

Table 1
Mean levels of body esteem, social anxiety, perceived stigmatisation, and life disengagement by group and time.

Variable	Intervention Group		CAU	
	Baseline <i>M</i> (SD; <i>n</i>)	Post-intervention <i>M</i> (SD; <i>n</i>)	Baseline <i>M</i> (SD; <i>n</i>)	Post-intervention <i>M</i> (SD; <i>n</i>)
Body Esteem	2.29 (0.86; 100)	2.53 (0.81; 62)	2.34 (0.84; 89)	2.44 (0.81; 77)
Social Anxiety				
FNE	20.86 (8.35; 100)	17.69 (6.42; 62)	21.26 (7.10; 89)	20.16 (7.05; 77)
SAD-New	17.27 (5.63; 100)	15.71 (4.86; 62)	17.07 (5.30; 89)	16.88 (5.76; 77)
SAD-General	8.67 (3.43; 100)	8.29 (2.90; 62)	8.94 (3.52; 89)	9.52 (3.69; 77)
Total SAS-A	46.80 (15.19; 100)	41.69 (12.11; 62)	47.27 (13.41; 89)	46.56 (14.06; 77)
Perceived Stigmatisation				
AFB	2.22 (0.54; 100)	2.13 (0.55; 61)	2.21 (0.57; 86)	2.13 (0.52; 74)
CSB	2.14 (0.66; 100)	1.92 (0.64; 61)	2.17 (0.69; 86)	2.10 (0.65; 74)
HB	1.74 (0.77; 100)	1.66 (0.67; 61)	1.82 (0.83; 86)	1.74 (0.78; 74)
Total PSQ	2.07 (0.50; 100)	1.94 (0.47; 61)	2.10 (0.52; 86)	2.02 (0.51; 74)
Life Disengagement	1.50 (0.52; 99)	1.36 (0.42; 61)	1.55 (0.48; 88)	1.51 (0.43; 74)

Note. Body Esteem = BE-Appearance Subscale; FNE = Fear of Negative Evaluation; SAD-New = Social Avoidance and Distress Specific to New Situations or Unfamiliar Peers; SAD-General = Social Avoidance and Distress in General; Total SAS-A = Social Anxiety Scale for Adolescents Total Scale; AFB = Absence of Friendly Behaviour; CSB = Confused and Staring Behaviours from Others; HB = Hostile Behaviour; Total PSQ = Perceived Stigmatisation Questionnaire Total Scale; Life Disengagement = Body Image Life Disengagement Questionnaire; CAU = Care as usual.

An alpha level of $\alpha = .05$ (two-tailed) was used for all statistical tests. To avoid issues with multiple comparisons, a correction (i.e. the Benjamini-Hochberg adjustment; Benjamini & Hochberg, 1995; reported as “corrected p ”) was applied to the main analyses including participants from both the intervention group and CAU (i.e. the ANCOVA’s) to reduce the risk of Type 1 errors. Intention-to-treat (ITT) analyses were run, as data were missing at random, using multiple imputation (MI; Rubin, 1987) to account for missing post-intervention data (Allison, 2000). One MI model was constructed separately for each outcome variable and the pooled mean of the imputed dataset consisting of five iterations was used. To improve model precision, gender and group were entered in each MI model together with baseline and post-intervention total scale scores. For transparency, the analyses were conducted using both the original dataset and with a dataset containing imputed values (i.e. ITT), and are reported accordingly in the results section. For the dataset containing the imputed values, only values based on pooled estimates are reported. As such, for the analyses conducted to test research question 3, pooled estimates were only available for the regression coefficients (see Table 4).

3. Results

3.1. Sample characteristics

Participants were 189 adolescents ($M = 14.36$ years, $SD = 1.82$, range: 11–18), with more girls ($n = 114$, 60%, $M = 14.43$ years, $SD = 1.82$) than boys ($n = 75$, 40%, $M = 14.24$ years, $SD = 1.82$). Approximately half of the participants had a craniofacial condition ($n = 100$, 53%), almost a fifth had a skin condition ($n = 42$, 22%), or conditions affecting body form such as missing limbs or fused fingers/toes ($n = 36$, 19%). The remaining participants had a scarring condition resulting from for example surgery or burns ($n = 11$, 6%). Approximately two thirds of the participants’ parents had completed primary, secondary, and/or high school as their sole education ($n = 112$ fathers, 59% and $n = 111$ mothers, 59%). The remaining parents had a university degree (i.e. Bachelor’s; $n = 21$ fathers, 11% and $n = 39$ mothers, 21%), or had an advanced degree (i.e. Master’s and/or Ph.D.; $n = 24$ fathers, 13% and $n = 20$ mothers, 11%).

3.2. Preliminary analyses

Baseline and post-intervention means and bivariate correlations for all outcome variables are presented in Tables 1 and 2. As randomisation was stratified by age only for participants living in the Netherlands, the relationship between age and group

Table 2
Bivariate correlations between all outcome variables across each group at baseline.

Variable	Intervention Group				CAU			
	1	2	3	4	1	2	3	4
1. Body Esteem	–				–			
2. Social Anxiety	–.64 ^a	–			–.46 ^a	–		
3. Perceived Stigmatisation	–.50 ^a	.58 ^a	–		–.29 ^a	.54 ^a	–	
4. Life Disengagement	–.54 ^a	.56 ^a	.51 ^a	–	–.30 ^a	.43 ^a	.43 ^a	–

Note. Body Esteem ($n = 189$) = BE-Appearance Subscale; Social Anxiety ($n = 189$) = Social Anxiety Scale for Adolescents Total Scale; Perceived Stigmatisation ($n = 186$) = Perceived Stigmatization Questionnaire Total Scale; Life Disengagement ($n = 187$) = Body Image Life Disengagement Questionnaire; CAU = Care as usual.

^a $p < .01$.

allocation for participants living in Norway was explored. For participants living in Norway, an independent samples t-test showed that age did not significantly vary between participants in the intervention group and CAU, $t(85) = 1.17$, $p = .25$. Intervention fidelity was measured by the amount of sessions completed, and around 62% of participants in the intervention group completed the seven main YPF sessions.

3.3. The effectiveness of YPF in improving primary and secondary outcomes

To explore differences between the intervention group and CAU, ANCOVA analyses were performed, using baseline primary and secondary outcome scores and country (i.e. country of residence) as covariates (see Table 3).

3.3.1. Body esteem and social anxiety

For body esteem, there was no statistically significant main effect of group post-intervention, $F(1, 135) = 0.727$, $p = .395$, $\eta_p^2 = 0.005$; corrected $p = .609$; ITT $p = .456$.

For the social anxiety total scale, there was a significant main effect of group post-intervention, with a moderate effect size, $F(1, 135) = 7.95$, $p = .006$, $\eta_p^2 = 0.06$; corrected $p = .04$; ITT $p = .017$. The adjusted post-intervention mean for the intervention group ($M = 42.09$, $SE = 1.10$) was lower compared with CAU ($M = 46.24$, $SE = 0.99$), demonstrating that social anxiety was reduced in the intervention group ($b = 4.16$). For fear of negative evaluation, there was a statistically significant main effect of group post-intervention, with a moderate effect size, $F(1, 135) = 7.26$, $p = .008$, $\eta_p^2 = 0.05$; corrected $p = .04$; but not in the ITT analyses ($p = .061$). For social avoidance

Table 3

Mean between-group difference (intervention–CAU) at post-intervention for all outcome variables, as well as standard errors, and confidence intervals. One-way analysis of covariance (ANCOVA).

Variable	Between-group difference			
	B (SE)	p-values	95% CI	η_p^2
Body Esteem	–0.08 (0.10)	.395	–0.27, 0.11	0.005
	–0.08 (0.10)	.456	–0.30, 0.14	
Social Anxiety				
FNE	2.10 (0.78)	.008*	0.56, 3.64	0.051
	1.71 (0.87)	.061	–0.09, 3.50	
SAD-New	1.14 (0.57)	.048	0.01, 2.26	0.029
	1.18 (0.55)	.033	0.10, 2.27	
SAD-General	1.01 (0.48)	.037	0.06, 1.96	0.032
	0.77 (0.42)	.069	–0.06, 1.59	
Total SAS-A	4.16 (1.48)	.006*	1.24, 7.08	0.056
	3.96 (1.56)	.017	0.77, 7.16	
Perceived Stigmatisation				
AFB	–0.01 (0.07)	.938	–0.14, 0.13	0.000
	–0.00 (0.07)	.972	–0.13, 0.13	
CSB	0.07 (0.08)	.426	–0.10, 0.23	0.005
	0.06 (0.08)	.422	–0.09, 0.22	
HB	0.02 (0.07)	.734	–0.12, 0.17	0.001
	–0.00 (0.07)	.970	–0.14, 0.13	
Total PSQ	0.02 (0.06)	.692	–0.09, 0.13	0.001
	0.00 (0.05)	.940	–0.09, 0.10	
Life Disengagement	0.11 (0.06)	.063	–0.01, 0.22	0.027
	0.09 (0.05)	.077	–0.01, 0.18	

Note. Numbers in bold indicate ITT analyses and included all participants that underwent initial randomisation (intervention group, $n=100$; CAU, $n=89$). b = mean between-group difference; Body Esteem ($n=139$) = BE-Appearance Subscale; FNE ($n=139$) = Fear of Negative Evaluation; SAD-New ($n=139$) = Social Avoidance and Distress Specific to New Situations or Unfamiliar Peers; SAD-General ($n=139$) = Social Avoidance and Distress in General; Total SAS-A ($n=139$) = Social Anxiety Scale for Adolescents Total Scale; AFB ($n=132$) = Absence of Friendly Behaviour; CSB ($n=132$) = Confused and Staring Behaviours from Others; HB ($n=132$) = Hostile Behaviour; Total PSQ ($n=132$); Life Disengagement ($n=133$) = Body Image Life Disengagement Questionnaire. Baseline scores and centre (i.e. Norway or Netherlands) served as covariates in each analysis.

* Significant at $p < .05$ after Benjamini-Hochberg adjustment.

specific to new situations or unfamiliar peers, there was a statistically significant main effect of group post-intervention with a small effect size, $F(1, 135) = 3.99$, $p = .048$, $\eta_p^2 = 0.03$; ITT $p = .033$, but not after correction ($p = .120$). For social avoidance and distress in general, there was a statistically significant main effect for group post-intervention with a small effect size, $F(1, 135) = 4.43$, $p = .037$, $\eta_p^2 = 0.03$, but not after correction ($p = .120$) and in the ITT analyses ($p = .069$).

3.3.2. Perceived stigmatisation and life disengagement

There were no statistically significant main effects post-intervention for the perceived stigmatisation total scale score ($F(1, 128) = 0.158$, $p = .692$, $\eta_p^2 = 0.001$; corrected $p = .816$; ITT $p = .940$), absence of friendly behaviour ($F(1, 128) = 0.006$, $p = .938$, $\eta_p^2 = .000$; corrected $p = .938$; ITT $p = .972$), confused/staring behaviour ($F(1, 128) = 0.639$, $p = .426$, $\eta_p^2 = 0.005$; corrected $p = .609$; ITT $p = .422$), or hostile behaviour ($F(1, 128) = 0.116$, $p = .734$, $\eta_p^2 = 0.001$; corrected $p = .816$; ITT $p = .970$). Country was significantly related to the hostile behaviour subscale post-intervention ($F(1, 128) = 5.879$, $p = .017$), indicating that participants in the Netherlands had higher perceptions of hostile behaviours compared with participants living in Norway. However, the main effect of country was not significant in the ITT analyses ($p = .077$).

For life disengagement, there was a non-significant main effect for group post-intervention ($F(1, 129) = 3.519$, $p = .063$, $\eta_p^2 = 0.027$; corrected $p = .126$; ITT $p = .077$).

3.4. Underlying predictors related to potential intervention improvements

To explore variables (i.e. baseline outcome scores, age, gender, time spent on YPF, and type of visible difference) that could potentially influence post-intervention outcome scores for the intervention group, while controlling for baseline scores, hierarchical multiple regression were conducted (see Table 4 for values from the original dataset and pooled estimates from the ITT analyses).

3.4.1. Predictors of primary outcomes

3.4.1.1. Body esteem. In Step 1, baseline scores significantly accounted for 51.7% of the variance in body esteem post-intervention, $F(1, 60) = 64.34$, $p < .001$. In Step 2, adding age, gender, country, time spent on YPF, and type of visible difference did not significantly improve the model, indicating that these variables did not explain variations in body esteem.

3.4.1.2. Social anxiety. In Step 1, baseline scores significantly accounted for 58.7% of the variance in social anxiety post-intervention, $F(1, 60) = 85.12$, $p < .001$. In Step 2, an additional 10.4% of the variance was significantly accounted for after introducing age, gender, country, time spent on YPF, and type of visible difference, into the model, $F(7, 53) = 2.55$, $p = .025$. Gender ($p = .016$) and country ($p = .046$) emerged as statistically significant predictors of overall levels of social anxiety post-intervention, where girls reported higher levels of social anxiety compared with boys, and participants living in the Netherlands had higher levels of social anxiety compared with participants living in Norway.

3.4.2. Predictors of secondary outcomes

3.4.2.1. Perceived stigmatisation. In Step 1, baseline scores significantly accounted for 54.4% of the variance in perceived stigmatisation post-intervention, $F(1, 59) = 70.27$, $p < .001$. In Step 2, adding age, gender, country, time spent on YPF, and type of visible difference did not significantly improve the model.

3.4.2.2. Life disengagement. In Step 1, baseline scores significantly accounted for 46.4% of the variance in life disengagement post-intervention, $F(1, 58) = 50.14$, $p < .001$. In Step 2, adding age, gender, country, time spent on YPF, and type of visible difference did not significantly improve the model.

4. Discussion

The current study is the first large-scale RCT to evaluate the effectiveness of Young Person's Face IT in improving body esteem, and/or reducing social anxiety, perceived stigmatisation, and life disengagement in adolescents with a visible difference. In general, results indicated that, compared with CAU, levels of social anxiety for the total scale were lower in the intervention group post-intervention. However, the intervention group did not significantly differ from CAU on levels of body esteem, perceived stigmatisation, or life disengagement post-intervention.

4.1. Web-based psychosocial support to reduce social anxiety

Research on adolescent samples with a visible difference has demonstrated higher levels of anxiety and fear of negative evaluations in this population (Griffiths et al., 2012; van Dalen et al., 2020). The results from the present study are therefore interesting and promising in that adolescents who completed the YPF programme displayed lower levels of social anxiety post-intervention, compared with CAU. This finding is also in line with Williamson et al. (2019).

Reduced levels of social anxiety may indicate that participants who completed YPF learned new social skills and anxiety-

Table 4

Hierarchical multiple regressions predicting changes in body esteem, social anxiety, perceived stigmatisation, and life disengagement, from baseline outcome scores, age, gender, country, time spent on YPF and/or type of visible difference of participants in the intervention group.

Step	Variable	Body Esteem				R ²	R ² _{adj}	ΔR ²	ΔF
		B (SE)	β	B 95% CI					
Step 1	Baseline body esteem	0.69 (0.09) ^a .066 (0.09)^a	0.72	0.52, 0.86 0.47, .085	0.52	0.51	0.52	64.34 ^a	
Step 2	Baseline body esteem	0.65 (0.09) ^a 0.65 (0.10)^a	0.68	0.47, 0.84 0.44, 0.86	0.59	0.52	0.07	1.23	
	Gender	-0.31 (0.16) -0.18 (0.13)	-0.19	-0.62, 0.00 -0.43, 0.07					
	Age	0.03 (0.04) 0.03 (0.03)	0.08	-0.05, 0.12 -0.31, 0.10					
	Country	-0.32 (0.16) -0.18 (0.15)	-0.19	-0.64, 0.01 -0.48, 0.12					
	Time spent on YPF	0.00 (0.01) 0.00 (0.01)	0.00	-0.02, 0.02 -0.02, 0.02					
	Skin condition	-0.05 (0.22) -0.03 (0.19)	-0.03	-0.49, 0.40 -0.41, 0.35					
	Craniofacial condition	0.13 (0.20) 0.07 (0.16)	0.08	-0.27, 0.53 -0.25, 0.38					
	Scarring condition	-0.03 (0.45) 0.14 (0.37)	-0.01	-0.92, 0.87 -0.59, 0.86					
Social Anxiety									
		B (SE)	β	B 95% CI	R ²	R ² _{adj}	ΔR ²	ΔF	
Step 1	Baseline social anxiety	0.59 (0.06) ^a 0.60 (0.06)^a	0.77	0.46, 0.72 0.49, 0.71	0.59	0.58	0.59	85.12 ^a	
Step 2	Baseline social anxiety	0.55 (0.07) ^a 0.58 (0.06)^a	0.71	0.42, 0.68 0.45, 0.71	0.69	0.64	0.10	2.55 ^b	
	Gender	5.06 (2.03) ^b 4.27 (1.66)^b	0.21	0.99, 9.13 1.00, 7.54					
	Age	0.12 (0.55) 0.08 (0.52)	0.02	-0.98, 1.22 -0.97, 1.14					
	Country	4.45 (2.18) ^b 1.59 (2.46)	0.18	0.08, 8.81 -3.67, 6.85					
	Time spent on YPF	-0.09 (0.13) -0.09 (0.13)	-0.05	-0.35, 0.18 -0.37, 0.18					
	Skin condition	1.90 (2.86) 1.86 (2.55)	0.07	-3.85, 7.64 -3.14, 6.85					
	Craniofacial condition	-2.50 (2.59) -1.05 (2.36)	-0.10	-7.69, 2.69 -5.72, 3.62					
	Scarring condition	-7.54 (5.76) -3.90 (5.02)	-0.11	-19.10, 4.02 -13.78, 5.98					
Perceived Stigmatisation									
		B (SE)	β	B 95% CI	R ²	R ² _{adj}	ΔR ²	ΔF	
Step 1	Baseline perceived stigmatisation	0.67 (0.08) ^a 0.70 (0.07)^a	0.74	0.51, 0.83 0.57, 0.83	0.54	0.54	0.54	70.27 ^a	
Step 2	Baseline perceived stigmatisation	0.66 (0.09) ^a 0.72 (0.07)^a	0.73	0.49, 0.84 0.58, 0.86	0.58	0.52	0.04	0.73	
	Gender	0.06 (0.09) 0.07 (0.08)	0.06	-0.12, 0.24 -0.09, 0.23					
	Age	0.01 (0.03) 0.00 (0.02)	0.03	-0.04, 0.06 -0.04, 0.05					
	Country	0.08 (0.10) 0.01 (0.07)	0.08	-0.11, 0.27 -0.13, 0.15					
	Time spent on YPF	0.00 (0.01) -0.00 (0.01)	0.04	-0.01, 0.01 -0.01, 0.01					
	Skin condition	-0.21 (0.13) -0.12 (0.11)	-0.21	-0.47, 0.05 -0.34, 0.10					
	Craniofacial condition	-0.20 (0.12) -0.10 (0.10)	-0.22	-0.43, 0.03 -0.29, 0.10					
	Scarring condition	-0.39 (0.26) -0.12 (0.24)	-0.15	-0.91, 0.13 -0.62, 0.37					

(continued on next page)

Table 4 (continued)

		Life Disengagement			R ²	R ² _{adj}	ΔR ²	ΔF
		B (SE)	β	B 95% CI				
Step 1	Baseline life disengagement	0.55 (0.08) ^a 0.52 (0.06)^a	0.68	0.39, 0.70 0.41, 0.63	0.46	0.45	0.46	50.14 ^a
Step 2	Baseline life disengagement	0.47 (0.08) ^a 0.49 (0.06)^a	0.59	0.31, 0.63 0.38, 0.60	0.56	0.49	0.10	1.62
	Gender	0.19 (0.09) ^b 0.16 (0.06)^b	0.23	0.02, 0.37 0.04, 0.29				
	Age	0.01 (0.02) 0.01 (0.02)	0.04	-0.04, 0.06 -0.02, 0.04				
	Country	0.03 (0.09) -0.03 (0.06)	0.04	-0.15, 0.22 -0.15, 0.09				
	Time spent on YPF	0.01 (0.01) 0.00 (0.00)	0.15	-0.00, 0.02 -0.01, 0.01				
	Skin condition	0.08 (0.12) 0.09 (0.10)	0.09	-0.16, 0.32 -0.11, 0.30				
	Craniofacial condition	-0.04 (0.11) 0.02 (0.08)	-0.04	-0.25, 0.18 -0.15, 0.18				
	Scarring condition	0.04 (0.24) 0.06 (0.20)	0.02	-0.45, 0.52 -0.33, 0.46				

Note. Numbers in bold indicate ITT analyses and included all participants that were initially randomised to the intervention group ($n = 100$). Body Esteem ($n = 62$) = BE-Appearance Subscale; Social Anxiety ($n = 62$) = Social Anxiety Scale for Adolescents Total Scale; Perceived Stigmatisation ($n = 61$) = Perceived Stigmatization Questionnaire Total Scale; Life Disengagement ($n = 60$) = Body Image Life Disengagement Questionnaire

^a $p < .001$.

^b $p < .05$.

management techniques over the course of the programme that contributed to a reduction in anxiety during social interactions. For instance, sessions in YPF specifically includes advice and guidance on how adolescents can handle teasing and bullying, and deal with unwanted attention such as staring and inappropriate questions, with opportunities to practice new social interaction skills via the programme's interactive videos, that they can then test in real-life situations (Williamson et al., 2019). YPF also includes CBT-based sessions that teach adolescents how to challenge negative thoughts and feelings, how to set realistic goals to overcome self-imposed limitations, and how to overcome social anxiety using anxiety-management techniques (Williamson et al., 2019).

The reduction in social anxiety among participants who completed YPF is consistent with the aim of the programme and aligns with previous research demonstrating that adolescents can adjust more positively to their visible difference by increasing their social skills repertoire, which may help them appear more confident, interesting, social and friendly to peers (Blakeney et al., 2005; Edwards et al., 2011). Additionally, CBT-based interventions, delivered face-to-face to adolescents with a visible difference (Maddern et al., 2006) or delivered online to adolescent community samples (Stjerneklar et al., 2019), have also proved effective in reducing anxiety. Thus the most important finding from this study is that YPF, an easily accessible self-guided intervention providing context-specific training in social skills to manage challenging social interactions combined with anxiety management and CBT-techniques to challenge unhelpful thought patterns, can contribute to reduced levels of social anxiety. However, it should also be noted that although our results regarding social anxiety were significant on a total scale level, results were a bit more inconclusive on a subscale level. For instance, although we did find statistically significant reductions in the three subscales of the SAS-A, these were found to be non-significant after corrections were applied (for social avoidance in new and unfamiliar situations, and distress in general), and in the ITT-analyses (for fear of negative evaluation).

4.2. Measuring body esteem, perceived stigma, and life disengagement in adolescents with a visible difference

In contrast to the present study's encouraging results regarding the effectiveness of YPF in reducing social anxiety, our results also showed

that YPF did not improve body esteem, or reduce perceived stigmatisation and life disengagement among adolescents who completed the intervention. This is in contrast to Williamson et al. (2019), who found positive changes for body esteem post-intervention in a much smaller sample. Although results from this larger RCT indicate that YPF is not being effective in improving these outcomes, factors that may have contributed to this result warrant discussion.

Although this study included acknowledged, reliable, and valid measures tested with the general population, chosen measures may not be sensitive enough to identify challenges specific to adolescents living with a visible difference. For instance, the Appearance Subscale of the BESAA (Mendelson et al., 2001) that was included in our study is primarily aimed at assessing adolescents' general appearance satisfaction, without specifically addressing concerns related to the presence and nature of a visible difference. A generic measure was chosen, since the large variation in included types of visible differences impeded the use of condition-specific measures. A general challenge within appearance-related research is the lack of validated psychometric cross-condition instruments that assess appearance concerns specifically in adolescents with a visible difference (Moss, Bailey, Griffiths, Lawson, & Williamson, 2014). It might therefore be the case that existing measures were not sensitive enough to capture variations in individuals' experiences of living with a visible difference and some measures therefore missed potential interventional benefits. Nonetheless, body esteem levels are generally found to be higher in adolescent community samples (e.g. Frisén et al., 2015) compared to the current study sample. This could indicate that the Appearance Subscale of the BESAA did capture some dissatisfaction with body esteem in our sample of adolescents with visible differences, even if differences between the intervention group and CAU were not found post-intervention.

Participants' degree of engagement with YPF may also have played a role. In the study by Williamson et al. (2019), engagement with YPF (defined as number of YPF sessions completed) was significantly related to positive changes in body esteem and reduced fear of negative evaluation post-intervention. In the present study, a slightly different measurement of engagement was included, that is, how many weeks participants spent completing YPF, irrespective of whether they completed all sessions or not. Both variables may indicate participants' engagement and

motivation in slightly different ways, and engagement with the intervention may presumably include additional aspects. These may include adolescents' own motivation to comply with intervention sessions, number of sessions completed and the amount of time spent on each session, and whether participants were prompted to complete the programme by the research team and/or by caregivers. It could be that increased intervention engagement is associated with increased intervention effects (Williamson et al., 2019). Future studies should therefore aim to capture how to measure engagement and also include different aspects of engagement, in order to obtain a more correct picture of how engagement with YPF relates to intervention effects.

4.3. Predictors related to intervention improvements

Hierarchical multiple regressions were conducted to explore variables that could have had an impact on post-intervention outcome scores among the intervention group. Overall, results did not provide support for age, country (i.e. country of residence), time spent on YPF, nor type of visible difference, in predicting possible improvements in adolescents that completed YPF, while controlling for baseline outcome scores. The presence of a visible difference is well known to be a cause of appearance-related distress in adolescents (Griffiths et al., 2012; van Dalen et al., 2020), irrespective of variations in size and location of the visible difference (Moss, 2005). This overall finding from general appearance research on the psychology of visible differences was confirmed in the present study, since variations in outcome measures were not related to types of included conditions or diagnoses.

Gender, however, significantly predicted social anxiety post-intervention, after accounting for baseline levels. Although social anxiety decreased from baseline to post-intervention for both boys and girls in the intervention group and CAU (as shown in Table 1), the hierarchical multiple regressions conducted only with the intervention group showed that gender differences in levels of social anxiety that were present at baseline (where girls reported more social anxiety than boys), were further increased after completing YPF. These results might potentially indicate that YPF is more effective in reducing social anxiety among boys than girls with a visible difference. Further investigation on the potential impact of gender on the effectiveness of an intervention such as YPF is therefore warranted.

4.4. Clinical implications and future research

Taken together, this study demonstrates that web-based psychosocial support, combining SST and CBT techniques, may contribute to reduced levels of social anxiety in adolescents with a visible difference. The usefulness of YPF is further supported by the fact that these changes also were clinically meaningful. Although, the effects of YPF on body esteem, perceived stigmatisation, and life disengagement were not significant, we propose that these findings require further investigation, with consideration to the included measures and aspects related to adolescents' engagement with the intervention, as discussed above. Nonetheless, our results suggest that YPF may benefit adolescents who struggle with social anxiety, a common challenge related to living with a visible difference.

It is important to note that other views exist in contrast to the definition of a clinically meaningful change used in the present study (i.e. a medium effect size). Some suggest that statistically significant group differences and effect sizes cannot provide information about clinical or practical relevance (Ogles, Lunnen, & Bonesteel, 2001; Pogrow, 2019), owing to a lack of information about the variety of individual responses to treatment. However, there are no standardised ways of defining a clinically meaningful change and

several approaches exist (Jacobson, Roberts, Berns, & McGlinchey, 1999). Additionally, BESAA, for instance, is not thoroughly validated in clinical populations (Kling et al., 2019) and we currently have no evidence of what the expected clinically meaningful change is for adolescents with a visible difference that have completed a web-based intervention based on SST and CBT. No normative data therefore exist with which to compare the results from the present study.

Nonetheless, the present study demonstrates that YPF seems to positively impact adolescents' social anxiety. This is a promising finding, since research and clinical experience indicate that many adolescents with a visible difference have limited access to specialised, evidence-based, and tailored interventions (Williamson et al., 2019), highlighting the usefulness of easy accessible treatment offers such as YPF for those who experience appearance-related anxiety. Combined with ease of accessibility, the content of YPF also makes the intervention attractive. YPF provides adolescents with the opportunity to learn and incorporate social coping skills that can be easily practiced and applied to real-life settings, and encourages adolescents to challenge negative appearance-related thoughts. Web-based psychosocial support may also become especially relevant when access to traditional face-to-face support is particularly limited. For example, psychosocial support was demonstrated to be restricted for many adolescents with chronic health conditions during the COVID-19 pandemic (Serlachius, Badawy, & Thabrew, 2020). This makes YPF an especially useful and accessible alternative for adolescents with a visible difference in need of immediate support.

In clinical settings, YPF may be incorporated as a low-level independent intervention for those who do not require complex clinical support and adolescents could self-refer, or used as an adjunct to support face-to-face therapy. However, incorporating web-based psychosocial support into the healthcare system is not straightforward. In a comparative case study, Folker et al. (2018) identified several barriers in implementing ICBT-based services in routine care settings, including financing, intake of patients, and scepticism from general practitioners towards ICBT. Lack of knowledge by stakeholders about the effectiveness of web-based psychosocial support and concerns about implementation also seem to constitute significant barriers towards integration of such services in the healthcare system (Topocco et al., 2017). It is therefore important to clarify aspects such as who should be in charge of monitoring patients, how patients should be recruited/referred, where financial resources should come from, and whether YPF should be implemented only in local support systems or across the healthcare system. Disseminating information to stakeholders about how ICBT-based interventions work and could be implemented, may perhaps also work to avoid unnecessary delays in the implementation process. More research is needed to shed light on these important questions regarding the implementation of web-based interventions such as YPF.

Future studies are also needed to investigate the potential short-term and long-term effectiveness of YPF in improving body esteem and reducing social anxiety, perceived stigmatisation, and life disengagement. Additionally, future research should consider investigating whether YPF could be offered as an early intervention to pre-adolescents who are at risk of developing symptoms of social anxiety and/or dissatisfaction with appearance due to a visible difference, and who may benefit from increasing their range of social skills and challenge negative appearance-related thoughts. YPF may also constitute an available alternative to traditional face-to-face treatment for adolescents who have conditions without regular medical follow-up and who may need psychosocial support, and for those who are not receiving psychological treatment elsewhere. We therefore also encourage further investigation on the cost-effectiveness of implementing the intervention.

4.5. Strengths and limitations

The main strength of the current study was the RCT-design, which made it possible to eliminate many potential confounders and thus improve internal validity. The study was also a result of an international collaboration and included participants from two countries, which strengthens the generalisability of results to a broader population. Additionally, we secured a large enough sample size to reach sufficient power to detect statistically significant changes in outcomes, which is often a general challenge within the visible difference research field (Gee et al., 2018; Williamson et al., 2019) and in intervention studies (Axén, Brämberg, Bakken, & Kwak, 2021).

Despite the study strengths, several limitations need to be considered. First, our study only included two points of assessment. Including an assessment after participants' completed the seven main YPF sessions, and before the booster session, could have provided an estimate of immediate intervention effects. Additionally, including an assessment to measure long-term intervention effects (e.g. three to six months post-intervention) would have provided an estimate of participants' outcome levels in the longer term, and determined the course and stability of intervention effects. Future research should therefore test the potential immediate and long-term effect of YPF, and evaluate whether improvement levels differ over time.

Second, although we used validated outcome instruments, included measures were not constructed specifically for a population consisting of adolescents with visible differences, and were therefore possibly not sensitive enough to capture changes in the adolescents' adjustment to their visible difference following completion of the intervention. However, there are currently no cross-condition measures that possibly would assess such changes. We therefore encourage future studies to identify measures that are sensitive enough to capture potential distress in adolescents with a visible difference across conditions, and/or consider developing new instruments specifically tailored to examine relevant outcome variables, in mixed groups such as in the present study. Additionally, outcome measures that were translated into Norwegian and/or Dutch for this specific study have not undergone language-specific psychometric evaluations, which is a methodological limitation. Relatedly, to the authors knowledge, no studies have tested measurement invariance for the Norwegian and Dutch version of BESAA, SAS-A, PSQ, or BILD-Q, which indicate whether the construct measured by a questionnaire has the same meaning to the same or different groups across different measurements (Putnick & Bornstein, 2016), which we acknowledge as a study limitation.

Third, there were some methodological differences between the two study sites that could have impacted on the results. Waiting-list control groups may prompt expectations influencing outcome scores. On the other hand, this solution was chosen in the Norwegian sample in order to secure recruitment and reduce ethical concerns, since the pilot study (Feragen, 2017) indicated that participants and parents found it difficult to accept that YPF would not be offered to participants in the control group. Moreover, no screening for subclinical symptoms was done in the study site in Norway and participants were therefore included irrespective of levels of body esteem, social skills, and/or symptoms of depression. However, the randomisation procedure and ANCOVA models should account for systematic baseline differences between participants and no differences were found for gender or type of visible difference between the two experimental groups. Nonetheless, variations in baseline outcome levels between the two study sites could mean that participants had different experiences of appearance-related distress and support needs, which may in turn have affected intervention effects.

Fourth, we only explored main effects when testing our research questions. Exploring interaction effects could have provided a better understanding of whether intervention effects differed between

boys and girls among those that completed YPF. Furthermore, although we found that gender predicted changes in social anxiety and life disengagement for the intervention group post-intervention, it could be that the main effect of gender was dependent on another moderating variable. Larger samples are therefore needed in order to shed light on this important issue.

Fifth, when reporting intervention fidelity and measuring adolescents' engagement with YPF we included only one possible aspect of engagement, namely how many weeks adolescents spent completing the intervention, irrespective of the number of sessions completed. Future studies should report other aspects related to fidelity, such as time spent on each intervention session, and include a closer investigation on how different aspects of adolescents' engagement with YPF could relate to intervention effects.

Sixth, strict exclusion criteria were employed when recruiting participants. Excluding adolescents with clinically diagnosed conditions (i.e. depression, psychosis, eating disorders, and PTSD), or those receiving another type of psychological treatment, may have limited the generalisability of our results to the sub-group of adolescents with comorbid mental health conditions. We therefore suggest that future studies also aim to include adolescents who may have a clinically diagnosed mental health condition and/or are receiving another type of psychological support, in order to evaluate the effectiveness of YPF also for this group. Furthermore, although we consistently reported how many participants were excluded from the analyses, reasons for exclusion of participants who did not meet eligibility criteria were only described using main categories (i.e. not meeting other inclusion criteria). As such, we encourage future RCTs to report information about exclusion of participants in detail.

Another limitation concerns socio-economic status (SES). Even though parents' SES has been previously found to influence adolescents' health-related quality of life (Kim, Wallander, Depaoli, Elliott, & Schuster, 2021), we did not control for SES in our analyses. This was due to the fact that parents' SES was assessed differently in Norway versus the Netherlands, and these different assessments could not be reliably equated. However, we recommend that future studies include indicators of SES in analyses of the YPF intervention to explore its potential influence.

Finally, the lockdown that ensued in both participating countries from COVID-19 might have negatively impacted participants' psychological well-being and/or influenced results. We were not able to systematically control for possible influences of COVID-19 due to several reasons, including a lack of resources and because participants were enrolled in the study before and during the pandemic. Additionally, the pandemic presented unique challenges to both countries and governmental efforts to control the virus were different. Hence, participants who completed the intervention during lockdown may not have had the same opportunity to apply new social skills as adolescents completing YPF with fewer social restrictions. Considering the impact that the COVID-19 lockdown may have had on adolescents' body image (Vall-Roqué, Andrés, & Saldaña, 2021), future studies should investigate how the pandemic might have affected the psychological well-being of adolescents with a visible difference.

5. Conclusion

This is the first study to experimentally test the effectiveness of Young Person's Face IT, a web-based psychosocial intervention developed for adolescents experiencing appearance-related distress and social challenges as a result of living with a visible difference. Our results showed that participants who completed YPF reported reduced social anxiety symptoms post-intervention, compared to participants receiving CAU. We found no intervention effect on body esteem, perceived stigmatisation, or life disengagement. To conclude, our study supports the notion of a web-based intervention

such as YPF having the potential to provide adolescents with knowledge and skills to manage the adverse social consequences of having a visible difference. Future studies are encouraged to further explore the effectiveness of YPF and its potential in reducing social anxiety, as well as investigating its long-term effects.

Declaration of interests

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CRediT authorship contribution statement

Deniz Zelihić: Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing. **Marije van Dalen:** Conceptualization, Resources, Formal analysis, Writing – review & editing. **Johanna Kling:** Conceptualization, Methodology, Formal analysis, Writing – review & editing, Supervision. **Are Hugo Pripp:** Conceptualization, Methodology, Validation, Formal analysis, Writing – review & editing, Supervision. **Tine Nordgreen:** Writing – review & editing. **Ingela L. Kvaalem:** Writing – review & editing. **Suzanne G. M. A. Pasmans:** Resources, Writing – review & editing. **Irene M. J. Mathijssen:** Resources, Writing – review & editing. **Maarten J. Koudstaal:** Resources, Writing – review & editing. **Manon H. J. Hillegers:** Resources, Writing – review & editing. **Heidi Williamson:** Conceptualization, Writing – review & editing, Supervision. **Elisabeth M. W. J. Utens:** Conceptualization, Resources, Writing – review & editing, Supervision, Project administration. **Kristin Billaud Feragen:** Conceptualization, Methodology, Resources, Formal analysis, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Jolanda M. E. Okkerse:** Conceptualization, Resources, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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