“IT FOSTERED A GREATER APPRECIATION FOR MY LITTLE CORNER OF THE WORLD”: A FEASIBILITY STUDY OF A THERAPEUTIC PHOTOGRAPHY INTERVENTION FOR THE WELL-BEING OF AUTISTIC YOUNG PEOPLE

MARINA CHARALAMPOPOULOU

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Abstract

The multifaceted nature of well-being has been overshadowed by an overwhelming focus on negative mental health in the autism literature. This has created a shortage of interventions addressing the promotion of positive emotional (hedonic) and psychological (eudaimonic) states. Therapeutic photography (TP), referring to self-initiated photo-taking activities paired with mindful reflections of the photographs, has the potential to provide an accessible and cost-effective approach to the development of positive mental health interventions for autistic emerging adults. The current study employed a mixed-methods methodology to explore the development, feasibility, and future adaptations of a novel TP intervention aimed at promoting hedonic and eudaimonic well-being among autistic emerging adults. Forty-one autistic young people between the ages of 16 and 25 were recruited. Participant reports indicated that TP is a largely feasible intervention with reference to the domains of demand, implementation, acceptability, practicality, and limited efficacy. Suggestions for future adaptations of the intervention are provided to best address the needs of the community based on study results. Our findings suggest that TP is a promising new direction in the application of positive psychology interventions to promote the well-being of autistic young people.

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"It Fostered a Greater Appreciation for My Little Corner of the World": A Feasibility Study of a Therapeutic Photography Intervention for the Well-Being of Autistic Young People

To date, research and intervention efforts pertaining to the well-being of autistic young people have been primarily centered on the incidence and deterrence of negative mental health outcomes, such as anxiety and depression (e.g., McMorris et al., 2019; Fombonne et al., 2020; Hossain et al., 2020). Notwithstanding the value in understanding the experience of psychopathology among autistic young people, this narrow deficit focus has overshadowed the multifaceted nature of well-being within the autism literature (Pellicano & den Houting, 2022). It is widely acknowledged that well-being is not merely defined as the absence of negative mental health states, but also includes the presence of positive emotional and psychological states (Keyes, 2002). As such, interventions for autistic people need to transcend the presently dominating limited focus on reducing negative mental health states and target multiple domains of well-being (Pellicano & Hayworth, 2023). Importantly, a need for such a paradigm shift has been highlighted by the autistic community (Chapman & Carel, 2022).

Positive psychology interventions complement the existing intervention literature by adopting this multifaceted conceptualization of well-being (Sin & Lyubomirsky, 2009). Although there are numerous measures and frameworks to capture different facets of well-being, within the positive psychology literature, well-being is commonly broadly defined by two dimensions: hedonia and eudaimonia (Ryan & Deci, 2001). The hedonic dimension of well-being (also referred to as emotional well-being), refers to experiences of positive emotions (e.g., happiness, excitement), the reduction of negative mental health states (i.e., depression and

anxiety), and a general sense of life-satisfaction (Deci & Ryan, 2008). The eudaimonic dimension of well-being (also referred to as psychological well-being), refers to experiences of meaning and purpose in one's life, environmental mastery (i.e., feeling in control of one's environments), personal growth (i.e., discovering different aspects of one's authentic self), autonomy, self-acceptance, and the presence of positive relationships (Ryff & Keyes, 1995). As such, the upregulation of positive emotions (Silton et al., 2020), meaning making (Manco & Hamby, 2021), and the development of a sense of purpose in life (Bronk et al., 2019) are common targets of positive psychology interventions. Positive psychology interventions have been found to lead to long and short-term improvements in hedonic and eudaimonic well-being in populations presenting with and without mental health challenges across all age groups, with the largest effects observed among children and emerging adults (Carr et al., 2021). There is a lack of consensus with reference to the mechanisms of change involved in positive psychology interventions. However, processes such as savouring (i.e., attending to and appreciating the positive aspects in one's life) and gratitude have been suggested as integral active ingredients in the promotion of the observed positive outcomes (Rashid & Seligman, 2018; Cullen et al., 2024; Dickens, 2017). Research on positive psychology interventions has primarily focused on adult populations (e.g., Koydemir et al., 2021); however, a recent review provided strong evidence for effectiveness of positive psychology interventions in increasing the well-being of neurotypical children and adolescents (Owens & Waters, 2020).

1.1.1 Well-being in the context of autism

There is increasing interest in the study and promotion of the positive facets of well-being among autistic people to counterbalance the considerable volume of research addressing negative mental health outcomes within this population (Iassielo et al., 2019). Notably, the

operationalization of well-being has varied considerably within the autism literature. Some studies have examined well-being among autistic individuals with a narrow focus on subjective well-being, based on a composite measure of different hedonic experiences, such as life satisfaction, quality of life, and/or experiences of happiness (e.g., Begeer et al., 2017; Grove et al., 2018). For instance, recent studies have explored life-satisfaction among autistic university students (Bailey et al., 2020) and the relationship between different vocational activities and happiness among autistic emerging adults (Clarke et al., 2021). Further, a limited number of studies have explored optimal well-being among autistic children and emerging adults using the constructs of thriving or flourishing, which include some facets of hedonic and eudaimonic well-being (Hilton et al., 2019; Weiss & Riosa, 2015; Simpson et al., 2022). Other studies have examined eudaimonic facets of well-being, such as autonomy and self-determination (Cheak-Zamora et al., 2020). Finally, some qualitative studies have explored the meaning of well-being according to the perspectives of autistic people and have found support for the importance of both the hedonic and eudaimonic dimensions. For instance, using a photo-elicitation study, Lam et al. (2020) reported that well-being for autistic young people involved different facets of eudaimonia, such as the expression of their unique selves, connectedness, engagement with the community, and fostering close relationships. Similarly, Danker et al. (2019) found that well-being within the school context for autistic adolescents was comprised of emotional, social, and well-becoming dimensions (i.e., ambitions and future planning).

Notably, an autism-specific framework of well-being has yet to be developed, which has further complicated the development of intervention efforts aimed at addressing this multifaceted construct (Simpson et al., 2024). Recently, the Autism Researcher Review Board (ARRB), a committee of autistic researchers within the Autism Intervention Research Network on Physical

Health, has recommended the use of the PERMA framework in the development and evaluation of new interventions for autistic people (Brown et al., 2022). The PERMA framework touches upon experiences of both hedonic and eudaimonic well-being (Seligman, 2011). PERMA defines well-being according to five domains: Positive emotions (i.e., experiences of happiness and pleasure), Engagement (i.e., feeling absorbed in tasks and entering a state of "flow"; Csikszentmihalyi, 1990), Relationships (i.e., having meaningful and positive interpersonal relationships), Meaning (i.e., having a purpose in life and serving something which is greater than the self), and Accomplishment (i.e., experiencing mastery and success in one's goals). The evaluation of the relevance of the PERMA framework to autistic people has been limited to a recent study for the validation of the PERMA Profiler, a questionnaire used to measure PERMA constructs, with a group of 517 autistic adults (Grosvenor et al., 2023). The questionnaire demonstrated excellent psychometrics properties for the overall scale (Cronbach's a = 0.93) and good psychometric properties for individual subscales. However, confirmatory factor analysis revealed that well-being, as defined by the PERMA, was best reflected as a single factor, rather than a five-factor model for this group (Grosvenor et al., 2023). These results indicate that while the PERMA model may be an appropriate framework for studying a positive dimension of well-being among autistic people, it may not capture nuances in their unique experiences of different domains of well-being. The use of the PERMA model may therefore be a good starting point for the development and evaluation of intervention efforts aimed at promoting the well-being of autistic young people.

1.1.2 Well-being among autistic emerging adults

Emerging adulthood refers to the developmental stage spanning late adolescence to the mid-twenties (Arnett, 2000). It is a highly challenging period marked by a search for identity,

uncertainty, increased demands for autonomy and changes in social relationships (Arnett, 2000). Autistic emerging adults, hereafter used interchangeably with *autistic young people*, report challenges across several domains of well-being. With reference to hedonic well-being, autistic young people report having fewer positive emotions compared to their neurotypical peers and experiencing considerable mental health problems, such as anxiety and depression (Lord et al., 2020; Lever & Geurts, 2016; Bennett et al., 2018). They also report experiencing significant challenges across different eudaimonic aspects of well-being. For instance, they struggle to find meaning in life, manage new expectations related to employment and finances, and maintain meaningful relationships (Cheak-Zamora & Odunleye, 2022; Cresswell et al., 2019; Flegenheimer & Scherf, 2022). Further, although they report that they generally look forward to the future, they also significantly worry about their transition to adulthood as they face uncertainties regarding their autonomy and opportunities for occupational and academic achievement in adulthood (Tesfaye et al., 2023; Sosnowy et al., 2018; Vincent, 2019; Taylor & Seltzer, 2011). Importantly, autistic young people face a significant loss of support services and barriers related to service accessibility and financial burden as they transition to adulthood (Roux et al., 2015; Malik-Soni et al., 2022; Ghanouni & Seaker, 2022). In consideration of these challenges, the development of accessible and cost-effective interventions aimed at increasing the well-being of autistic young people is indicated (King et al., 2020).

1.2. Interventions for the well-being of autistic young people

Interventions aimed at increasing the well-being of autistic emerging adults, beyond the scope of the reduction of negative mental health challenges, are scarce. There are indeed a number of studies indicating that psychological interventions, such as cognitive behavioural therapy, are effective in reducing mental health problems for autistic young people (Sharma et

al., 2021); however, such interventions often do not address positive aspects of well-being. In a recent systematic review, Bottema-Beutel et al. (2023a) found that the majority of interventions developed for transition aged autistic people were behavioural in nature and targeted the reduction of "challenging" behaviours, the promotion of verbal and social skills, and the development of academic and vocational skills. Notably, well-being was not referenced as an intervention target in any of the included studies. Further, although some of interventions for autistic people have focused on aspects related to well-being, such as subjective well-being (e.g., Hartley et al., 2019), social engagement (e.g., Diener et al., 2016), connectedness (e.g., Koegel et al., 2013), and empowerment (e.g., Hatfield et al., 2018), most interventions do not target more than one aspect of well-being. To date, there are no interventions targeting the multidimensional nature of well-being for autistic young people. Since interventions that target multiple aspects of hedonic and eudaimonic well-being are reported to be most effective in the promotion of positive outcomes among neurotypical populations (Carr et al., 2021), this is a valuable next step in the development of interventions for autistic young people.

1.3. Therapeutic photography

Therapeutic photography (TP) may address the shortage of interventions aimed at improving the well-being of autistic emerging adults. TP is defined as the "structured, guided engagement with the creative intervention of photography in order to produce images for exploration with clearly defined outcomes for the participant" (Gibson, 2018, p.33). It involves *self-initiated* photo-based activities, such as photo-taking activities and photo-guided reflections. TP interventions may be delivered individually or in a group format; however, the primary distinguishing characteristic of TP interventions from other photo-based therapeutic methods, such as phototherapy, is that a therapist is not required for their delivery (Loewnthal, 2023). This

is what renders TP an accessible and cost-effective intervention design, since the only requirement for participation is access to a photo-taking device (Saita & Tramontano, 2018).

TP has been employed to facilitate empowerment, self-exploration, self-efficacy, and engagement with natural, built, and social environments (Gibson, 2018). Other reported outcomes of TP include reductions in depression and anxiety, post-traumatic growth, and increases in motivation and self-determination (Kurtz, 2015; Read et al., 2022; Tourigny & Naydenova, 2020). Since the intended outcomes of the TP vary significantly, there is a lack of research indicating the specific mechanisms of change involved in these interventions. With reference to the autism literature, to date, there is only one case study showcasing the use of TP to promote self-efficacy and identity exploration among autistic adults (Gibson, 2018). However, in general, photography has been successfully employed in research practices, such as photo-elicitation studies, with the autistic community (e.g., Courcy & Koniou, 2022; Cheak-Zamora et al., 2016; Teti et al., 2016; First et al., 2019).

Current Study

The current study employed a mixed-methods approach to explore the development, feasibility, and future adaptations of a novel TP intervention aimed at promoting hedonic and eudaimonic well-being among autistic emerging adults. The aim of feasibility studies is to examine the relevance and sustainability of novel interventions prior to conducting full-scale investigations assessing efficacy (Bowen, 2009). They are often indicated when a proposed intervention methodology has not been previously examined in the literature, there are unique considerations for the target populations of a proposed interventions, and/or there is a need to further establish community partnerships (Bowen, 2009). Feasibility studies are particularly relevant in the development of interventions for autistic people as their voices have largely been

absent from the literature (Pellicano & den Houting, 2022). As such, a primary consideration in the development of our intervention was ensuring that it aligned with the values and needs of the autistic community. The current study had three aims: 1) to describe the development of a novel TP intervention for autistic emerging adults; 2) to evaluate the feasibility of TP for promoting the well-being of autistic emerging adults; and 3) to inform future adaptations for TP based on study results. Based on a framework by Bowen et al. (2009), feasibility was evaluated according to the domains of demand, implementation, practicality, acceptability, and limited efficacy.

Method

Participants

Inclusion criteria for the current study were met if participants indicated that they 1) self-identified or were diagnosed by a professional as autistic; 2) were between 16 and 25 years; and 3) resided in Ontario, Canada. Forty-one participants between 16 and 25 years of age (M = 20.87, SD = 2.84) provided informed consent to participate in the study and completed baseline measures. As shown in Table 1, many participants identified as cis females (39%), non-binary (22%), and cis males (17.1%). Most identified as white (56.1%), followed by mixed heritage (22.2%), and East or Southeast Asian (9.8%). Forty participants (97.6%) had a professional diagnosis of autism; many also had additional neurodevelopmental diagnoses (53.7%), with ADHD being the most common (48.8%). Of those who reported on their mental health diagnoses (n = 35), the majority (82.9%) reported having at least one mental health diagnosis, including anxiety (71.4%), depression (42.9%), and post-traumatic stress disorder (22.9%). Participants also reported having many support needs, including supports for emotion regulation (endorsed by 39%), attention (31.7%), and other behaviours (31.7%). Of the 41 participants who completed baseline measures, 37 (90.2%) completed the intervention.

Table 1

Participant Demographic and Clinical Characteristics

	Enrolled in intervention (n = 41)		Completed intervention (n = 37)	
	M(SD) or *n(%)*	Range	*M(SD)* or *n(%)*	Range
Age	20.87 (2.84)	16-25	20.99 (2.87)	16-25
AQ-S	79.44 (11.74)	57-106	79.11(11.70)	57-106
FSIQ-2 [a]	109.70 (17.08)	58 -140	109.35 (17.53)	58 -140
PPVT-5	106.51 (12.97)	67-127	106.86 (12.70)	67-127
Number of support needs	1.68 (1.77)	0-6	1.62 (1.78)	0-6
Gender				
Cis female	16 (39.0)	-	16 (43.2)	-
Cis male	7 (17.1)	-	5 (13.5)	-
Transgender male	3 (7.3)	-	2 (5.4)	-
Non-binary	9 (22.0)	-	8 (21.6)	-
Agender	2 (4.9)	-	2 (5.4)	-
Not sure / Other	4 (9.7)	-	4 (10.8)	-
Ethnicity				
White	23 (56.1)	-	20 (54.1)	-
Black	3 (7.3)	-	2 (5.4)	-
South Asian	2 (4.9)	-	2 (5.4)	-
East/Southeast Asian	4 (9.8)	-	4 (10.8)	-
Middle Eastern	3 (7.3)	-	3 (8.1)	-
Mixed Heritage	5 (12.2)	-	5 (13.5)	-
Other	1 (2.4)	-	1 (2.7)	-
Household income				
<$24,999	12 (29.3)	-	10 (27.0)	-
$25,00 - 74,999	11 (26.8)	-	10 (27.0)	-
>$75,000	9 (22.0)	-	8 (21.6)	-
Not sure / Prefer not to disclose	9 (22.0)	-	9 (24.3)	-
Neurodevelopmental diagnoses [b]				
Autism	40 (97.6)	-	36 (97.3)	-
Learning Disability	5 (12.2)	-	4 (10.8)	-
Attention Deficit Hyperactivity Disorder	20 (48.8)	-	16 (43.2)	-
Intellectual Disability	1 (2.4)	-	1 (2.7)	-

	Enrolled in intervention (n = 41)		Completed intervention (n = 37)	
	M(SD) or *n(%)*	Range	*M(SD)* or *n(%)*	Range
Neurodevelopmental Motor Disorders	3 (7.3)	-	2 (5.4)	-
Other	2 (4.9)	-	2 (5.4)	-
Not sure	1 (2.4)	-	1 (2.7)	-
Mental health diagnoses [c]				
Anxiety Disorder	25 (71.4)	-	22 (71.0)	-
Bipolar Disorder	4 (11.4)	-	3 (9.7)	-
Depression	15 (42.9)	-	14 (45.2)	-
Eating Disorder	4 (11.4)	-	4 (12.9)	-
Personality Disorder	2 (5.7)	-	1 (3.2)	-
Post-traumatic Stress Disorder	8 (22.9)	-	7 (22.6)	-
Psychosis	1 (2.9)	-	1 (3.2)	-
Other	4 (11.1)	-	3 (9.7)	-
No mental health diagnoses	6 (17.1)	-	5 (16.1)	-
Types of support needs [d]				
Reading	2 (4.9)	-	2 (5.4)	-
Writing	7 (17.1)	-	6 (16.2)	-
Speaking	3 (7.3)	-	3 (8.1)	-
Understanding words	6 (14.6)	-	6 (16.2)	-
Attention	13 (31.7)	-	12 (32.4)	-
Emotion regulation	16 (39.0)	-	13 (35.1)	-
Repetitive behaviours	9 (22.0)	-	7 (18.9)	-
Other behaviours	13 (31.7)	-	11 (29.7)	-
Other	1 (2.4)		1 (2.7)	-
No support needs	16 (39.0)	-	15 (40.5)	-

AQ-S = Autism Quotient Short Form; FSIQ-2 = Full-Scale Intelligence Quotient from Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II); PPVT-5 = Peabody Picture Vocabulary Test – Fifth Edition; [a]n = 1 case missing in enrolled in intervention group; [b]multiple response options available; [c]n = 6 did not report in both groups, multiple response options available; [d] multiple response options available

Procedure

Pre-study community consultation

Prior to recruitment efforts, autistic people and their family members were invited to share their thoughts about the proposed intervention and study design. An anonymous questionnaire was shared via social media between April and June 2023. Respondents reviewed an online consent form and provided informed consent. They were then provided with a brief description of the intervention and study procedures followed by questions surveying their interest, access, and comfort related to different aspects of the study. Participants were asked whether they (or their autistic family member) had previously participated in TP (0 = 'No', 1 = 'Yes', 2 = 'Not Sure') and whether they (or their autistic family member) have access to a mobile device with a camera (0 = 'No', 1 = 'Yes', 2 = 'Not Sure'). They were also asked to rate how comfortable they (or their autistic family member) felt using a mobile device to take simple photographs of their environments (1 = 'Not Comfortable at All', 4 = 'Very Comfortable'), their (or their autistic family member's) interest in participating in a TP intervention (1 = 'Not Interested At All', 4 = 'Very Interested'), and their (or their autistic family member's) interest in participating in the semi-structured interview process following the intervention (1 = 'Not Interested At All', 4 = 'Very Interested'). Respondents were also asked if they had any concerns about the intervention (0 = 'No', 1 = 'Yes') and were prompted to share their concerns and/or any additional comments in an open-ended response format.

Ninety-three members of the autistic community, including 64 autistic people (68.8%) and 29 family members (31.2%), completed the survey. Respondents were between the ages of 13 and 56 years (M = 34.49; SD = 12.86). Approximately 59% identified as cis women, 14% identified as cis men, and 61% identified as members of the LGBTQ2IA+ community. Only

15.3% identified as members of a racial, ethnic, and/or religious minority group. Most respondents (83.3%) did not have prior experience with TP, had access to a mobile device with a camera (94.7%), and felt comfortable using their mobile devices to photograph their environments (89.1% were at least moderately comfortable). Respondents expressed interest in participating in the described TP intervention (75.7% were at least moderately interested) and in completing a post-intervention interview (68.2% were at least moderately interested).

Some participants (12.7%) expressed concerns about not having enough information to inform their interest in the study and feeling nervous about the post-intervention interview. This input was used to tailor the research design to be more autistic-informed. For example, participants were provided with the option of reviewing interview questions prior to the interview, and details of what to expect from the research method and team were provided in writing and video format.

Intervention

Intervention development was completed in collaboration with two autistic advisors, who are research assistants at our lab. For the duration of four weeks, participants were asked to photograph the environments which contribute to their well-being. Well-being was defined by the EPOCH framework (Kern et al., 2016), which is an adaptation of the PERMA framework meant to reflect adolescent experiences of well-being. The wording of the EPOCH questions is non-developmental and presents no context specificity (i.e., items are general enough to reflect positive experiences across contexts and be relevant to respondents of different ages), therefore when employing the EPOCH framework "normative immaturity is not spuriously associated with lower well-being" (Kern et al., 2016, p.587). As both frameworks are highly similar, and given the developmental challenges often experienced by autistic emerging adults, the EPOCH

framework was chosen over the adult-focussed PERMA framework. The EPOCH framework conceptualizes well-being according to the five characteristics constituting the acronym: Engagement (i.e., feeling absorbed in tasks and entering a state of "flow"; Csikszentmihalyi, 1990), Perseverance (i.e., the ability to pursue one's goals when encountering different obstacles), Optimism (i.e., envisioning a positive future, framing negative events as temporary, and feeling hopefulness and confidence regarding one's future prospects), Connectedness (i.e., feeling satisfied, cared for, loved, and valued in reference to one's relationships, as well as providing friendship and support to others), and Happiness (i.e., consistently experiencing positive mood and satisfaction with one's life). The Happiness subscale captures the hedonic domain of well-being, whereas the Engagement, Perseverance, Optimism, and Connectedness subscales capture the eudaimonic domain of well-being.

During their initial lab visit, prior to the 4 weeks commencing, participants received an orientation to the intervention. The different aspects of the intervention and the definitions of the EPOCH constructs were explained thoroughly, in simple language, by a member of our research team, using a PowerPoint presentation. Visual examples of photographs related to each of the constructs were also provided. To increase accessibility, participants were provided with the option of using their smartphones or a lab provided digital camera to capture their photos. Each week, participants focused their photo-taking activities on a different domain of well-being according to the EPOCH framework: Week 1: Happiness, Week 2: Connectedness, Week 3: Optimism, Week 4: Engagement and Perseverance. At the end of each week, participants were asked to select a maximum of four photos which they believed best captured their experiences of the domain of well-being assigned to each week (e.g., at the end of Week 1, participants were asked to select four photos which best captured their experience of Happiness). At submission,

they were asked to think about the situations they were in while taking each photo and answer four questions: 1) *What emotions where you feeling when you took this photo? You can describe your feelings in any way that makes sense to you.* 2) *What led you to choose to take this photo? What were you trying to capture in the situation by taking it?* 3) *What is it about this photo or the situation that was important to you?* 4) *Is there anything else you want to tell us about this photo or the situation? If so, please tell us.* Participants had the option of submitting their reflections in the form of written or voice memos, depending on what they felt most comfortable with. At the beginning of each week, participants received an email including the weekly domain and a reminder to complete their journal submissions. At the end of each week, participants received an email with a link for their weekly reflections. Participants received a reminder email to complete their reflections two days after the end of each week if they had not provided a submission. All parts of the intervention could be completed independently or with the help of a support person, according to individual support needs.

Study design

Ethical approval for this study was obtained from York University prior to data collection. Participants were recruited using online flyers sent to local organizations and social media advertisements. Respondents to the community consultation were also invited to participate. Recruitment took place between July 2023 and January 2024. Interested participants contacted the research team via email. Eligible participants were provided with a link to an online consent form and a demographics questionnaire. Caregiver consent was provided for some participants, based on individual needs, and assent was reviewed during their first visit to the lab. After completing consent and demographics questionnaires, participants scheduled their first visit to York University. They were provided with a welcome package including written and

visual directions to our lab, an introduction to our research team (including photos of everyone), and a welcome video explaining what to expect during their first visit. Participants were also encouraged to be accompanied by a support person during their visits to the lab, should that be their preference.

Visit 1: Participants first completed a brief physiological measure of heart rate variability (not part of the current study) followed by all baseline questionnaires, and the WASI-II and PPTV-5, in a standardized setting. Participants were then introduced to the TP intervention and the EPOCH framework of well-being (Kern et al., 2016). Prior to departing, participants received a package including: a photo log sheet including the weekly themes and the intervention timeline, a printout of the TP orientation, instructions on how to upload their photos, and an appointment confirmation for their second visit. Visits lasted approximately 1 hour, and participants received a $200 gift certificate for their participation.

Visit 2: Participants returned to York University for a second visit following the completion of the intervention (M = 10.08 days after completing intervention, SD = 8.85). They first completed post-intervention questionnaires on a lab computer, followed by a physiological measure of heart rate variability and a frustration task, both of which are beyond the scope of the feasibility study. Finally, participants completed a brief semi-structured interview with a member of the research team, discussing photos and their experiences during the intervention. At their request, five participants completed post-intervention online questionnaires, prior to their visit, and two participants completed their semi-structured interviews via telephone. On average, visits lasted approximately 1.5 hours and participants received a $200 gift certificate for their participation.

Measures

Baseline functioning

WASI-II: The Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II; Wechsler, 2011) was used as a brief measure of cognitive functioning. Participants completed the two subtest Full-Scale Intelligence Quotient (FSIQ-2) comprised of the Vocabulary and Matrix Reasoning subtests. The FSIQ-2 composite score has demonstrated excellent psychometric properties for neurotypical adults (Cronbach's α = .94; McCrimmon & Smith, 2013).

PPVT-5: The Peabody Picture Vocabulary Test – Fifth Edition (PPVT-5; Dunn, 2019) was used to assess receptive language abilities. The PPVT-5 has demonstrated excellent psychometric properties with neurotypical adults (Cronbach's α = .97; Dunn, 2019) and been used as a proxy for verbal IQ for autistic populations (Krasileva et al., 2017).

AQ-S: The Autism Spectrum Quotient–Short Form (AQ-S; Hoekstra et al., 2011) was used as a measure of autistic traits. The AQ-S includes 28 items which are rated on a 4-point Likert scale from 1 ('Definitely Agree') to 4 ('Definitely Disagree'). Items were reverse coded, when applicable, and summed scores were calculated, with higher scores indicating the presence of more autistic traits. The AQ-S has demonstrated good internal consistency with autistic adults (Cronbach's α = .86; Hoekstra et al., 2011). Internal consistency with the current sample was good (Cronbach's α = .85).

Feasibility

Intervention feasibility was evaluated according to five of the eight key domains for feasibility identified by Bowen et al. (2009): a) demand, b) implementation, c) acceptability, d) practicality, and e) limited efficacy. Provided the novelty of the current intervention, the

feasibility domains of adaptation, expansion, and integration, were not assessed in the current study. A priori criteria for some feasibility domains were defined based on the criteria presented in Prime et al. (2023) (see Appendix A Table 2). Provided the heterogeneity and diversity of an autism sample, we did not consider a priori criteria in a pass/fail way, but as a way to learn about how best to adapt our methods (Teresi et al., 2023).

a) Demand refers to the interest expressed towards an intervention by the target population (Bowen et al., 2009). The following measures were used to assess intervention demand.

Participant Recruitment and Interest: In addition to the findings of the pre-study community consultation (results presented above), interest in the intervention was evaluated according to recruitment numbers and timelines, based on a goal of recruiting 25 participants between July 2023 and January 2024. To further assess interest in the intervention of those enrolled in the study, the following question was asked as part of baseline measures: *How interested are you in therapeutic photography?* Participants indicated their levels of interest on a scale ranging from 1 ('Not Interested at All') to 4 ('Very Interested').

b) Implementation refers to the extent to which an idea can be successfully delivered to a target population (Bowen et al., 2009). The following measures were used in the evaluation of intervention implementation.

Participant adherence: Participant adherence was calculated as the proportion of recruited participants who completed the intervention. Intervention completion was defined as completing at least three of the four weeks of TP (i.e., more than 75% of the intervention). This was evaluated based on participants' reflection uploads (i.e., participants who uploaded at least one reflection for three or more weeks were considered to have completed the intervention).

Participant engagement: Participant engagement was assessed according to 1) the proportion of recruited participants who completed all four weeks of the intervention (i.e., uploaded at least one reflection for each of the four weeks); 2) the average number of reflections (out of the total 16 required reflections) uploaded by participants; and 3) the average number of reflections uploaded for each of the weeks.

Participant retention: Participant retention was assessed according to the proportion of recruited participants who completed at least one component of the post-intervention assessment (i.e., post-intervention measures and/or interviews).

FIM: The 4-item Feasibility of Intervention Measure (FIM; Weiner et al., 2017) was used to assess the degree to which participants found the intervention to be implementable, possible, doable, and easy to use. Participants rated their agreement with each item on a five-point scale ranging from 1 ('Completely Disagree') to 5 ('Completely Agree'). Mean scores were calculated with higher scores indicating more favourable perceptions regarding intervention implementation. The FIM has demonstrated good internal consistency ($\alpha = 0.89$; Weiner et al., 2017). Internal consistency with the current sample was also good (Cronbach's $\alpha = .82$).

c) Acceptability refers to extent to which an intervention is deemed to be acceptable and appropriate (Bowen et al., 2009). Intervention acceptability was evaluated using the following measures.

AIM: The 4-item Acceptability of Intervention Measure (AIM; Weiner et al., 2017) was used to assess the degree to which participants liked, welcomed, approved, and found the intervention appealing. Participants rated their agreement with each item on a five-point scale ranging from 1 ('Completely Disagree') to 5 ('Completely Agree'). The mean of all items was calculated, with higher scores indicating higher levels of acceptability. The AIM has

demonstrated good internal consistency (Cronbach's α = .85; Weiner et al., 2017). Internal consistency with the current sample was excellent (Cronbach's α = .90).

IAS: Three of the seven items of the Implementation Acceptability Scale (IAS; Lee et al., 2022) were used to assess participants' affective attitudes ("I feel positively about this program"), the ethicality of the intervention ("The program aligned well with my values"), and its perceived effectiveness ("This program was effective in achieving its goals"). Participants rated their agreement with each item on a five-point scale from 1 ('Strongly Disagree') to 5 ('Strongly Agree'). The scale has been developed according to a theoretical framework of acceptability (Sekhon et al., 2017) and has been previously used in the evaluation of an intervention for autistic children (Lee et al., 2022). Agreement on each item is examined separately.

IAM: The 4-item Intervention Appropriateness Measure (IAM; Weiner et al., 2017) was used to assess the degree to which participants found the intervention to be fitting, suitable, applicable, and a good match. Participants rated their agreement with each item on a 4-point Likert scale from 1 ('Completely Disagree') to 5 ('Completely Agree'). Mean scores were calculated, with higher scores indicating higher levels of intervention appropriateness. The IAM has demonstrated excellent internal consistency (Cronbach's α = .91; Weiner et al., 2017). Internal consistency with the current sample was good (Cronbach's α = .88).

NEQ: The 20-item version of the Negative Effects Questionnaire (NEQ; Rozental et al., 2019) was used to assess participants' experiences of adverse outcomes during their participation in TP. The NEQ surveys the occurrence and severity of 20 different negative effects experienced in the duration of an intervention. Participants were asked if they experienced each negative effect (0 = 'No', 1 = 'Yes'), how negatively they were affected on

a scale from 0 (‘Not at all’) to 4 (‘Extremely’), and if they attributed each effect to TP (0 = ‘Other Circumstances’, 1 = ‘Therapeutic Photography’). Descriptive statistics and mean frequencies across all negative effects were calculated. Negative effects were categorized into one of five factors: symptoms, quality, stigma, hopelessness, and dependency. The frequency and the mean scores of the negative impact for each factor were also calculated. Minor alterations were made to the original wording of the NEQ to best reflect the nature of the current intervention (i.e., the words “treatment” and “therapist” were altered to “program” and “research team”, respectively). The NEQ has demonstrated excellent internal consistency (Cronbach’s $\alpha = 0.95$; Rozental et al., 2019). Psychometric properties with the current sample are not available due a limited number of reported negative effects.

d) Practicality refers to the extent to which an intervention can be carried out using existing resources (Bowen et al., 2009). The following measures were used to assess intervention practicality.

***Device Access and Comfort*:** Five questions were included in baseline measures to assess intervention practicality. Participants reported if they had access to a laptop (0 = ‘No’, 1 = ‘Yes’, 2 = ‘Not sure’), if they had access to a photo-taking device (0 = ‘No’, 1 = ‘Yes’, 2 = ‘Not sure’), and which device (e.g., smartphone, tablet, digital camera) they felt most comfortable using for their photo-taking activities. Participants were also asked the following questions to assess their level of comfort with the tasks involved in the intervention: 1) *How comfortable are you with taking photos on a device (e.g., camera, phone, tablet)?* 2) *How comfortable are you with uploading/sharing photos from a device to a computer?* They reported their answers on a 5-point Likert scale from 1 (‘Not comfortable at all’) to 5 (‘Very comfortable’)

***IAS**:* Two items from the Implementation Acceptability Scale (IAS; Lee et al., 2022) were used to assess participants' perceptions of intervention burden ("The amount of effort required to do this program was acceptable") and opportunity costs ("I did not need to give up resources or opportunities in order to participate in this program"). Participants rated their agreement with each item on a 5-point scale ranging from 1 ('Strongly Disagree') to 5 ('Strongly Agree').

e) Limited efficacy is defined as a preliminary evaluation of the effects of a new intervention (Bowen et al.; 2009). Limited efficacy was assessed based on changes in different domains of hedonic and eudaimonic facets of well-being. Participants' perceptions of the different components of the intervention were also evaluated.

Measures of well-being

EPOCH: The EPOCH Measure of Adolescent Well-being (Kern et al., 2016) was used to evaluate participants' experiences for five domains of well-being. The EPOCH consists of 20 items corresponding to five subscales. Each subscale includes four questions and focuses on a different domain of well-being: Engagement (e.g., "When I do an activity, I enjoy it so much that I lose track for time"), Perseverance (e.g., "I finish whatever I begin"), Optimism (e.g., "I am optimistic about my future"), Connectedness (e.g., "There are people in my life who really care about me"), and Happiness (e.g., "I feel happy"). Participants rated the degree to which each statement described their experiences of well-being on a five-point scale ranging from 1 ('Almost Never') to 5 ('Almost Always'). Mean subscale and mean total EPOCH scores were calculated, with higher scores representing higher levels of positive well-being. The EPOCH is a well-validated measure with neurotypical adolescent samples (Buerger et al, 2023; Choi et al., 2021), and has demonstrated good internal validity on the subscale level (Cronbach's α

ranging 0.76 for the Engagement subscale, to 0.87 for the Connectedness subscale), and excellent internal validity on the overall scale level (Cronbach's α = 0.90; Kern et al., 2019). With the current sample, internal consistency was good for the Happiness and Connectedness subscales (Cronbach's α = 0.83 for both at pretest), acceptable for the Engagement (Cronbach's α = 0.79 at pretest) and Optimism subscales (Cronbach's α = 0.72 at pretest), and poor for the Perseverance subscale (Cronbach's α = 0.58 at pretest). The overall scale demonstrated good internal consistency (Cronbach's α = 0.85 at pre-test).

PROMIS–MP: The PROMIS – Meaning and Purpose Scale (PROMIS-MP; Salsman et al., 2020) was used to assess participants' experiences of meaning and purpose. The PROMIS – MP is a 4-item questionnaire surveying constructs related to hopefulness (e.g., "I feel hopeful about my future"), life goals (e.g., "I can reach my goals in life"), meaning (e.g., "My life is filled with meaning"), and purpose (e.g., "My life has purpose"). Participants were asked to think about their lives and rate their agreement with each item on a 5-point Likert scale ranging from 1 ('Not at All') to 5 ('Very Much'). Mean scores were calculated, with higher scores indicating higher levels of perceived meaning and purpose. The PROMIS-MP has demonstrated excellent psychometric properties among autistic adolescents and adults (Cronbach's α = 0.94; Graham Holmes et al., 2020). Internal consistency with the current sample was excellent (Cronbach's α = 0.90 at pre-test).

GAD-7: The Generalized Anxiety Disorder 7-item Scale (GAD-7; Spitzer et al., 2006) was used to assess anxiety-related symptoms. Participants reported how frequently they had experienced seven anxiety related symptoms in the preceding two-week period on a 4-point Likert scale from 0 ('Not at All') to 3 ('Nearly Every Day'). Summed scores were calculated, with higher scores reflecting higher levels of anxiety. The GAD-7 has demonstrated excellent

internal consistency among autistic emerging adults (α = 0.92; Hull et al., 2019). Internal consistency for the current sample was good (Cronbach's α = 0.80 at pre-test).

PHQ-9: The Patient Health Questionnaire 9-item Scale (PHQ-9; Kroenke et al., 2001) was used to assess mood-related symptoms. Participants reported how frequently they had experienced nine depressive symptoms in the preceding two-week period on a 4-point Likert scale from 0 ('Not at All') to 3 ('Nearly Every Day'). Summed scores were calculated, with higher scores reflecting higher levels of depressive symptoms. The PHQ-9 has demonstrated excellent internal consistency among autistic adults (α = 0.91; Cassidy et al., 2021). Internal consistency for the current sample was good (Cronbach's α = 0.81 at pre-test).

Evaluation of intervention components: Three questions were used to survey participants' perceptions regarding the different components of the intervention. Participants were asked to identify which part of the intervention was the most enjoyable and most challenging and indicate what they considered to have contributed the most to their well-being. For each question, they selected one of five response options, corresponding to the different components of the intervention ('Finding the right environments to take photos of', 'Taking the photos', 'Selecting which photos to talk about in the reflections', 'Talking about my photos', 'Not sure').

Semi-structured interviews

Following the completion of the intervention and as part of their second visit to the lab, participants completed a semi-structured interview surveying the benefits, challenges, and possible future adaptations for the intervention. One question from the interview addressed intervention acceptability: 1) *What challenges did you experience while participating in therapeutic photography?* Another question was used to qualitatively evaluate the efficacy of the

invention: 1) *What benefits did you experience while participating in therapeutic photography?* Select follow-up questions were asked: 1) *Did this intervention help reduce your negative mental health states (e.g., depression, anxiety, and stress levels)? If so, in what way(s)?* 2) *Did this intervention help increase your positive well-being? If so, in what way(s)?* Finally, two questions were used to evaluate ways of adapting the intervention to increase feasibility: 1) *What would you change about this intervention?* and 2) *What additional supports would have been helpful for practicing therapeutic photography?*

Data analysis

Following a convergent parallel mixed-methods design, quantitative and qualitative data were collected concurrently and were initially analyzed separately and then integrated for interpretation. Equal weight is placed on quantitative and qualitative findings (Cresswell & Clark, 2011).

Quantitative analysis

Statistical analyses were performed using IBM SPSS Version 29.02. Variable distributions and internal consistencies were assessed for continuous measures. Statistical assumptions of normality and linearity were inspected, and no major violations were noted. Each variable was inspected for outliers, resulting in one data point being winzorized (Tukey, 1977). Feasibility outcomes, including demand, implementation, practicality, and acceptability are reported using descriptive statistics.

Only data from the 36 participants who completed the intervention were included in limited efficacy testing. Raw change scores were first calculated for all examined well-being outcomes (i.e., EPOCH total and subscales, PROMIS-MP, GAD-7, and PHQ-9), by subtracting post-intervention from pre-intervention scores. Preliminary correlational analyses were

conducted to identify demographic and clinical characteristics related to changes in well-being from pre- to post-intervention. Pearson product-moment and Spearman correlations were used to explore associations between change scores for well-being outcomes and demographic and clinical variables (i.e., age, cognitive functioning (FSIQ-2), receptive language abilities (PPVT), autistic traits (AQ-S), number of support needs, mental health diagnoses). Since a negative relationship has been reported between positive experiences of well-being and negative mental health states in the literature (Keys, 2005), correlations between changes in positive domains of well-being (i.e., EPOCH and PROMIS-MP), and baseline measures and change scores in mood and anxiety (i.e., PHQ-9, GAD-7) were explored. Pearson correlations were also used to examine relationships between change scores and feasibility variables, including domains of demand (i.e., interest in TP), practicality (i.e., comfort with taking photos), implementation (i.e., FIM), and acceptability (i.e., IAM, AIM, and NEQ). Finally, themes from qualitative reports of intervention challenges (i.e., 0 = no challenge reported; 1 = challenge reported) were dummy coded and correlated with change scores.

Paired samples t-tests were used to evaluate pre- to post-intervention changes in the domains of anxiety (i.e., GAD-7), mood (i.e., PHQ-9), and meaning and purpose (i.e., PROMIS-MP). Since significant correlations were observed between several EPOCH change scores and FSIQ, repeated measures ANCOVAs were used to examine pre- to post-intervention changes in overall EPOCH scores and EPOCH subscale scores (i.e., Engagement, Positive Emotions, Optimism, Connectedness, and Happiness), with time (pre-intervention, post-intervention) as the within subject factor and FSIQ as the covariate. A between-subjects factor was not included. An alpha level of 0.05 was used and Cohen's d and η^2 were used to calculate within-subject effect sizes.

Qualitative analysis

Responses to questions included in the post-intervention semi-structured interview were used to qualitatively evaluate intervention acceptability and limited efficacy and explore suggestions for future adaptations for the intervention. Qualitative analysis was conducted using Robinson's (2022) structured tabular thematic analysis (ST-TA) approach; a thematic analysis approach tailored to brief texts. A hybrid inductive and deductive approach was adopted given the novelty of the intervention and exploratory nature of the analyses. ST-TA involves five phases: deep immersion in the data, generation of initial codes and themes, tabulation of themes against data segments, calculation of inter-analyst agreement, quotation selection, and generation of thematic maps. Two analysts, including myself and another graduate student, immersed themselves in the data by extensively examining participant responses. The first coder then generated themes for participant responses. Participant responses were attached to themes in a tabulated form and each response was scored as 1 or a 0, depending on whether it encapsulated each theme/subtheme. A random sample of 20 responses was selected and scored independently by the analysts. Inter-analyst agreement was then calculated according to the frequency of themes and subthemes based on the two coder's scoring. Themes were finalized when 80% agreement was reached in the two analysts' scoring. Quotes were then selected to represent themes and subthemes.

Results

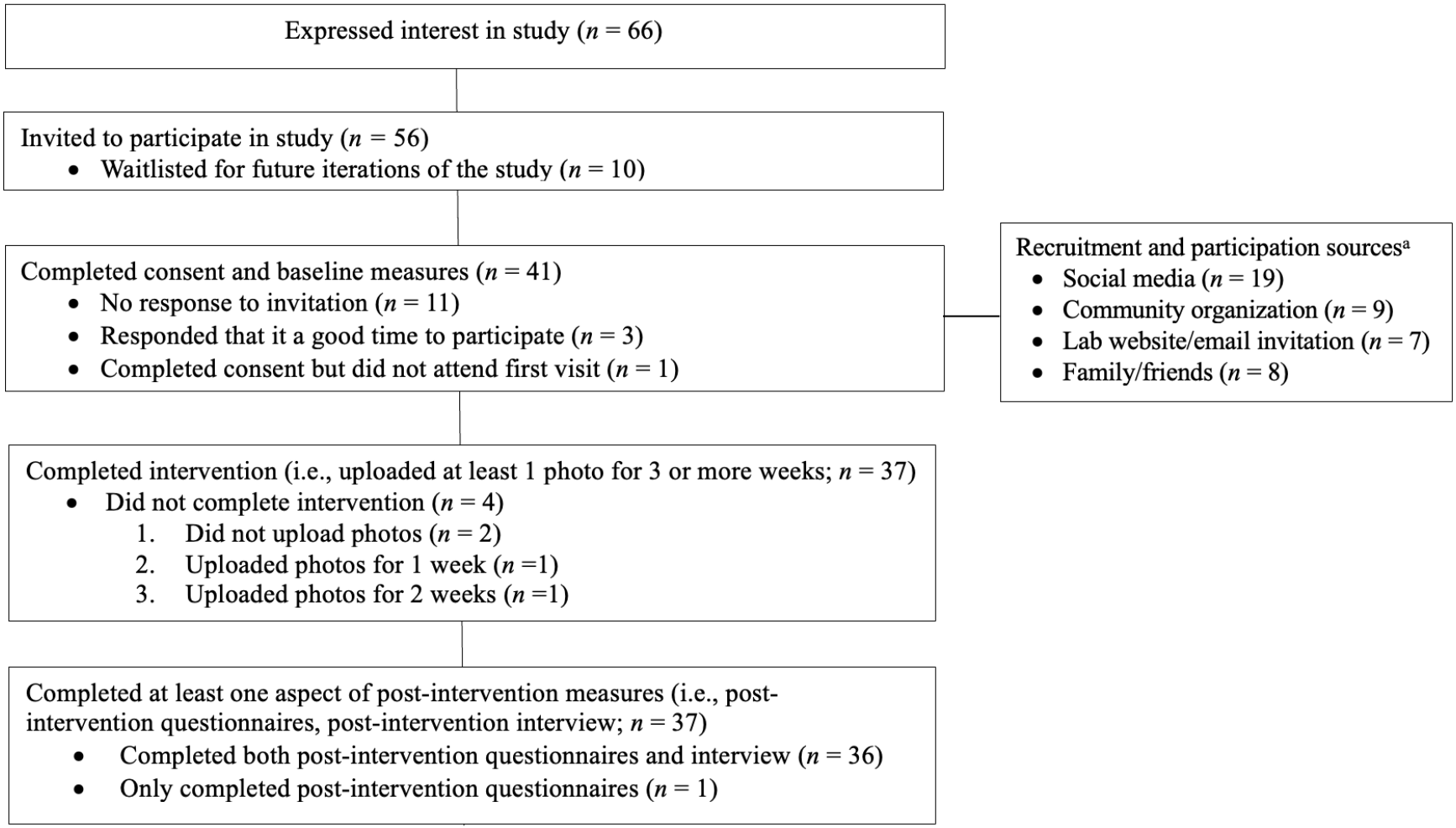
Demand

Participant recruitment was completed in the allotted timeframe (i.e., more than 25 participants were recruited prior to January 2024). As seen in Figure 1, of the 56 individuals who expressed interest and were invited to participate in the intervention, 41 completed baseline

measures. Interest in TP varied among those enrolled in study: 21 (51.2%) were very interested, 11 (26.8%) were slightly interested, 4 (9.8%) were neither interested or disinterested, 3 (7.3%) were very disinterested, and 2 (4.9%) were unsure of their interest in the intervention.

Figure 1

Flowchart of Participant Recruitment



Note. [a]multiple response options available

Implementation

Intervention adherence was high, with 37 participants (90.2%) completing the intervention (i.e., uploaded at least one reflection for three or more weeks). Regarding participant engagement, 35 participants (82.9%) completed all four weeks of the intervention (i.e., uploaded at least one reflection for all four weeks), two (4.9%) completed three weeks, one (2.4%) completed two weeks, one (2.4%) completed one week, and two (4.9%) did not complete any of the weeks (4.9%). On average, participants uploaded approximately 13 (SD = 4.44) reflections across all four weeks (81.3% of the 16 required reflections). Weeks 1 and 4 (Happiness and Engagement/Perseverance) had the highest average number of reflection uploads (M_{week1} = 3.46, SD_{week1} = 1.05; M_{week2} =3.33, SD_{week2} = 1.05), followed by Week 2 (Connectedness; M = 3.24, SD = 1.37) and Week 3 (Optimism; M = 2.9, SD = 1.30). Regarding participant retention, most participants (90.2%) completed at least one part of post-intervention measures, with 37 participants (90.2%) completing the questionnaire and interview portions of post-intervention measures. One participant (2.4%) only completed the post-intervention questionnaires as they appeared fatigued during their visit to the lab and the research team decided to forego the post-intervention interview. The data from one participant who completed post-intervention measures was not recorded due to technical error, therefore post-intervention questionnaire and interview data is available for 36 participants. On the FIM, participants who completed the intervention reported high levels of implementation feasibility (M = 4.28, SD = .63). Specifically, participants reported that they found TP to be implementable (83.3% “agreed” or “strongly agreed”), possible (88.9%), as well as doable and easy to use (94.4%).

Acceptability

Participants who completed the intervention reported high levels of intervention acceptability on the AIM (*M* = 4.06, *SD* = .80). They reported that they liked and welcomed TP (83.3%) and "agreed" or "strongly agreed" that the intervention was appealing to them (80.6%) and met their approval (77.8%). Participants also indicated high levels of intervention appropriateness on the IAM (*M* = 3.86, *SD* = .90). They reported that the intervention was a good match (83.3%) and applicable (77.8%); however, a smaller proportion of participants "agreed" or "strongly agreed" that TP was suitable (63.9%) and fitting (58.3%;). Selected IAS items indicated that participants felt positively about TP (86.1%) and considered the intervention to be aligned with their values (77.8%); however, a lower level of agreement was endorsed with reference to intervention effectiveness (50.0%).

With reference to the NEQ, 33 participants (91.7%) reported experiencing negative effects related to external circumstances and 15 (41.7%) attributed at least one negative effect to TP. The frequency of negative effects attributed to external stressors ranged from 0 to 11 (*M* = 3.7, *SD* = 2.8), and primarily included increases in problems related to sleep (endorsed by 41.7%), stress (41.7%), and worries (36.1%). The frequency of negative effects related to TP ranged from 0 to 9 (*M* = 1.25, *SD* = 2.17). The most commonly reported intervention-related adverse effects involved increases in symptoms (e.g., stress; endorsed by 25% of participants); however, the average negative impact of these effects was very low (*M* = 0.67, *SD* = 1.43). Negative effects attributed to TP included concerns about the quality of the intervention (endorsed by 22.2%; negative impact: *M* = 0.48, *SD* = 1.18), experiences of stigma (11.1%; *M* = 0.25, *SD* = 0.77), and feelings of hopelessness (8.3%; *M* = 0.42, *SD* = 1.65). Dependency on TP was not reported by any participants.

Table 2

Negative Effects Reported in the Duration of the Intervention (N=36)

Factor	Item	*n(%)*attributed to EC	*n(%)* attributed to TP
Symptoms	I had more problems with my sleep.	15 (41.7)	2 (5.6)
	I felt like I was under more stress.	15 (41.7)	5 (13.9)
	I experienced more anxiety.	12 (33.3)	1 (2.8)
	I felt more worried.	13 (36.1)	2 (5.6)
	I experienced more unpleasant feelings.	12 (33.3)	1 (2.8)
	I felt that the issue I was looking for help with got worse.	6 (16.7)	0
	Unpleasant memories resurfaced.	15 (41.7)	4 (11.1)
	I got thoughts that it would be better if I did not exist anymore and that I should take my own life.	8 (22.2)	0
Quality	I did not always understand the program.	4 (11.1)	6 (16.7)
	I did not always understand the research team.	0	2 (5.6)
	I did not have confidence in the program.	1 (2.8)	1 (2.8)
	I felt that the treatment did not produce any results.	4 (11.1)	5 (13.9)
	I felt that my expectations for the research team were not fulfilled.	3 (8.3)	0
	I felt that the program was not motivating.	2 (16.7)	3 (8.3)
Stigma	I became afraid that other people would find out about the program.	0	4 (11.1)
	I started feeling ashamed in front of other people because of the program.	0	3 (8.3)
Hopelessness	I experienced more hopelessness.	8 (22.2)	2 (5.6)
	I stopped thinking that things could get better.	7 (19.4)	1 (2.8)

Factor	Item	*n(%)*attributed to EC	*n(%)* attributed to TP
	I started thinking that the issue I was seeking help for could not be made any better.	9 (25.0)	3 (8.3)
Dependency	I think that I have developed a dependency on the program.	0	0

Note. NEQ = Negative Effects Questionnaire; EC = External Circumstances; TP = Therapeutic Photography.

Practicality

Most participants who completed baseline measures (n = 41) reported that they had access to a computer for uploading their photos (94.4%) and a device with a camera for their photo-taking activities (100%). Most participants (83.3%) preferred to use their mobile devices for their photo-taking activities. They reported that they felt comfortable using their devices to take photos (97.2% reported feeling "moderately" or "very comfortable") and uploading their photos (91.7%). On the IAS, those who completed post-intervention measures noted that they did not have to give up resources to participate in TP (94.4% "agreed" or "strongly agreed") and found the amount of effort they had to put into TP acceptable (80.6%).

Limited efficacy

With the exception of FSIQ and age, demographic and clinical characteristics were not significantly correlated with changes in well-being (i.e., PPVT scores, autistic traits (AQ-S), number of support needs, and having a mental health diagnosis; $p > .05$). A significant negative relationship was found between age and changes in Perseverance (rho = - .43, p = .01). Further, higher FSIQ was correlated with increases in total EPOCH scores (r = .50, p = .002), as well as Engagement (r = .51, p = .002), Optimism (r = .34, p = .05), and Connectedness scores (r = 0.39, p = .02). Baseline mood and anxiety (i.e., pre-intervention PHQ-9 and pre-intervention GAD-7

scores, respectively) symptoms and changes in mood and anxiety (i.e., changes in PHQ-9 and GAD-7 scores), were not significantly correlated with changes in any of the positive domains of well-being (i.e., EPOCH overall and subscale scores, and PROMIS-MP scores; $p > .05$). As shown in Table 3, some significant correlations were found between changes in well-being measures and feasibility domains of implementation and acceptability (e.g., FIM was positively correlated with increases in total EPOCH, Engagement, and Happiness; AIM was positively correlated with increases in Happiness; and IAM was negatively correlated with changes in GAD-7). Further, experiencing challenges in identifying the domains of well-being was positively correlated with improvements in Engagement (*rho* = .35, $p = .04$), Optimism (*rho* = .36, $p = .04$), and Meaning and Purpose (*rho* = .40, $p = .02$).

Table 3

Correlations Among Change Scores in Domains of Well-Being and Feasibility Variables (N=36)

		Change Scores									Feasibility Outcomes				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	GAD7[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.	PHQ9[a]	.39*	-	-	-	-	-	-	-	-	-	-	-	-	-
3.	PROMIS-MP[a]	.19	-.11	-	-	-	-	-	-	-	-	-	-	-	-
4.	EPOCH Total[a]	-.13	-.27	.38*	-	-	-	-	-	-	-	-	-	-	-
5.	Engagement[a]	.04	-.19	.11	.72**	-	-	-	-	-	-	-	-	-	-
6.	Perseverance[a]	-.19	-.12	.26	.62**	.24	-	-	-	-	-	-	-	-	-
7.	Optimism[a]	-.13	-.23	.46**	.64**	.29	.34*	-	-	-	-	-	-	-	-
8.	Connectedness[a]	-.10	-.25	.11	.63**	.31	.19	.31	-	-	-	-	-	-	-
9.	Happiness[a]	-.14	-.08	.30	.64**	.50**	.24	.14	.24	-	-	-	-	-	-
10.	Interest in TP[b]	-.05	-.15	-.02	-.04	.12	-.24	.13	.11	-.19	-	-	-	-	-
11.	FIM	-.08	-.12	.06	.39*	.36*	.27	.22	.08	.34*	-.04	-	-	-	-
12.	AIM	-.17	-.17	.15	.31	.21	.11	.11	.15	.45**	.07	.56**	-	-	-
13.	IAM	-.41*	-.23	-.20	.13	.09	.07	.02	-.04	.28	.03	.39*	.69**	-	-
14	NEQ EC Frequency[a]	.36*	.19	-.15	-.30	-.17	-.14	-.27	-.09	-.29	.21	-.19	-.15	-.17	-

[a] Correlations were calculated with change scores for each well-being variable. [b] Spearman correlations are reported. *Note.* GAD-7 = Generalized Anxiety Disorder 7-item Scale; PHQ-9 = Patient Health Questionnaire 9-item Scale; PROMS-MP = Pediatric Meaning and Purpose – Short Form; TP = Therapeutic Photography. FIM = Feasibility of Intervention Measure; AIM = Acceptability of Intervention Measure; IAM = Intervention Appropriateness Measure; IAS = Implementation Acceptability Scale; NEQ EC = Negative Effects Questionnaire External Circumstances.

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Notably, the frequency of negative effects from external circumstances on the NEQ was associated with increases in anxiety (*rho* = .36, *p* = .03), therefore an exploratory analysis further explored the impact of negative effects related to external circumstances on anxiety change scores. An independent samples t-test revealed that differences in anxiety change scores between the 16 participants who reported increases in worry and/or anxiety due to external stressors on the NEQ (*M* = 0.38, *SD* = 4.80) and the 20 participants who did not (*M* = -1.40, *SD* = 3.30) were not significantly different (*t*(34) = -1.31, *p* = .20, *d* = -.44).

As shown in Table 4, paired samples *t*-tests revealed no significant differences between pre- and post-intervention in anxiety (i.e., GAD-7; *t*(35) = -0.90, *p* = .374, *d* = -.15) and mood symptoms (i.e., PHQ-9; *t*(35) = -1.83, *p* = .08, *d* = -.31), and significant improvements in experiences of meaning and purpose (i.e., PROMIS-MP; *t*(35) = 2.71, *p* = .01, *d* = .45). Provided correlations between FSIQ and most EPOCH change scores, repeated measures ANCOVAs, controlling for IQ, were used to evaluate changes in EPOCH domains. As shown in Table 5, findings indicated significant improvements in the EPOCH full scale (*F*(1,34) = 10.72, *p* = .002, η^2 = .24), and the Engagement (*F*(1,34) = 11.66, *p* = .002, η^2 = .26) and Connectedness subscales (*F*(1,34) = 5.42, *p* = .026, η^2 = .14). Changes in Optimism were also approaching significance (*F*(1,34) = 4.12, *p* = .05, η^2 = .11), whereas significant changes were not observed for the Perseverance (*F*(1,34) = 1.38, *p* = .25, η^2 = .04) and Happiness subscales (*F*(1,34) = 1.38, *p* = .25, η^2 = .04).

Thirty-four participants reported their perceptions regarding different intervention components. The majority of participants identified taking photos as the most enjoyable aspect of the TP (endorsed by 55.6%). Several participants indicated that talking about their photos (33.3%) and finding appropriate environments to photograph (27.8%) were the most challenging

parts of the intervention for them. With reference to the aspects of the intervention that participants believed to have contributed the most to their well-being, taking photos and talking about their photos were the most common choices (each endorsed by 33.3% of participants), followed by finding the right environments to photograph (19.4%), and selecting photos for their weekly reflections (5.6%). One participant (2.8%) reported that they were unsure about which aspect of TP contributed the most to their well-being.

Table 4

Results of Paired Samples t-tests (N=36)

Measure	Pre-TP *M (SD)*	Post-TP *M(SD)*	*t*	*p*	*d*
GAD-7	11.00 (5.06)	10.39 (6.07)	-.90	.37	-.15
PHQ-9	11.42 (5.79)	10.36 (5.98)	-1.83	.08	-.31
PROMIS - MP	3.25 (.98)	3.51(.94)	2.71	.01*	.45

PROMIS-MP = Pediatric Meaning and Purpose – Short Form; GAD-7 = Generalized Anxiety Disorder 7-item Scale; PHQ-9 = Patient Health Questionnaire 9-item Scale; TP = Therapeutic Photography. *$p < .05$

Table 5

Results of Repeated Measures Within-Subject Analyses of Covariance (ANCOVAs; N=36)

Measure	Pre - TP *M (SD)*	Post -TP *M (SD)*	*df*	*MS*	*F*	*p*	η^2
EPOCH: Full Scale	3.13 (.53)	3.14 (.61)					
Time			1	.59	10.72	.002**	.24
Time * FSIQ-2			1	.62	11.26	.002**	.25
Error			34	.06	7.678		
EPOCH: Engagement	3.37 (.89)	3.34 (.91)					
Time			1	1.66	11.66	.002**	.26
Time * FSIQ-2			1	1.65	11.61	.002**	.26
Error			34	.14			
EPOCH: Perseverance	2.99 (.69)	2.88 (.72)					
Time			1	.23	1.38	.25	.04
Time * FSIQ-2			1	.18	1.03	.32	.03
Error			34	.17	.03		
EPOCH: Optimism	2.44 (.65)	2.57 (.90)					
Time			1	.67	4.12	.05	.11
Time * FSIQ-2			1	.84	5.19	.03*	.13
Error			34	.16			
EPOCH: Connectedness	3.85 (.99)	3.92 (.97)					
Time			1	.80	5.42	.03*	.14
Time * FSIQ-2			1	.90	6.11	.02*	.15
Error			34	.15			
EPOCH: Happiness	2.97 (.61)	3.00 (.83)					
Time			1	.21	1.38	.25	.04
Time * FSIQ-2			1	.23	1.57	.25	.04
Error			34	.14			

Note. FSIQ-2 = Full-Scale Intelligence Quotient from the Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II). *$p < .05$, **$p < .01$

Semi-structured interviews

Challenges

Although some participants reported that they did not encounter any challenges while participating in therapeutic photography, most identified at least one challenge related to the intervention. The challenges indicated by participants fell into three main themes: 1) challenges related to the selected domains of well-being; 2) challenges related to the reflective process; and 3) challenges related to the integration of therapeutic photography in participants' daily lives. These challenges mirrored quantitative results on the NEQ with reference to negative effects related to the program quality (i.e., challenges in understanding parts of the program) and increases in symptoms (i.e., worries or stress related to TP). Further, reported challenges aligned with quantitative findings regarding the suitability, fit, and alignment of the program with participant values.

Challenges related to the selected domains of well-being included: a) identifying and differentiating experiences related to the domains; and b) a lack of opportunities to experience the domains. *a) Identifying and differentiating experiences related to the domains:* Participants reported challenges in identifying how the domains of well-being showed up in their lives. For some, this was related to a general difficulty in naming and attaching emotions to their experiences (i.e., alexithymia). Others attributed this difficulty to the specific domains of well-being selected for the intervention. Domain definitions may be difficult to distinguish from each other and the descriptions and examples provided in our orientation documents may have been too "vague". Other participants noted that because the domains did not resonate with them, they felt unfamiliar, irrelevant, or inauthentic to their experiences. One participant noted:

> It was also challenging to come up with things that fit the prompt. In a way, many of the photos from the first few weeks were less natural than I expect would've been the ideal for this intervention. On top of overall not being a particularly happy person, I'm also really bad at naming and recognising feelings. I have alexithymia, so I needed to be really cognizant of what was going on, and that was a little stressful.

b) Lack of opportunities to experience the selected domains: Participants indicated that they lacked opportunities to experience some of the selected domains of well-being: "I tend to think my life is sort of boring…I don't take pictures because…I feel like there's nothing to take pictures [of]." In agreement with findings on the NEQ, participants also noted various external stressors, unrelated to the intervention, while participating in TP, which limited their exposure to positive experiences. Some participants reported that some of their weeks were particularly uneventful due to school- or work-related demands: "Week 3 was a challenge because nothing happened in my life, so I was scrambling to find photos." The absence of these experiences in their weeks was associated with negative emotions. Participants may feel "worried" about not having enough positive experiences to photograph, or "embarrassed" about not having enough "exciting" photos to share.

Challenges related to the integration of therapeutic photography in participants' daily lives included*:* a) time-management; b) remembering to engage in photo-taking activities; and c) confidentiality. a) *Time management:* Several participants highlighted a difficulty adhering to the weekly deadlines. It may be challenging for participants to incorporate different aspects of TP into their schedules, making it too "time-consuming" or challenging to find the time to seek photo-taking opportunities: "I didn't have enough time, because of school, to leave my house and try to find settings." b) *Remembering to engage in photo-taking activities****:*** If participants did not

routinely engage in photography prior to the intervention, it may be difficult for them to habitually engage in photo-taking: “I am not someone who thinks to take out my phone and take a photo when something happens, so I frequently missed the moment and only thought to take a photo after.” Others reported that they often forgot to take photos of positive experiences because they were immersed “in the moment”. Several participants noted that it was challenging to remember the weekly domains of well-being and frequently forgot to photograph experiences related to them. The provided photo schedules and reminder emails helped some respondents to remain engaged in photo-taking. c) *Confidentiality:* The issue of confidentiality was also identified as a challenge in participants’ efforts to integrate TP in their daily lives. The process of requesting permission to take photographs in public spaces felt “scary” or “embarrassing” to some, as they feared that potential questions about their engagement in photo-taking activities might lead to an “outing” of their autistic identity. One participant reported that they did not feel comfortable asking their friends to pose for photos related the study. Further, some participants reported that confidentiality was a concern in the process of completing their weekly reflections. For instance, one participant noted that although they preferred to complete their reflections using the voice recording option, they did not always feel comfortable to do so: “I think I liked [the] voice recording a bit better, but I was not always in a position where I could be talking out loud, so I typed.”

Challenges related to the reflective process included*:* a) determining the content of weekly reflections; and b) reviewing and sharing experiences. *a) Determining the content of weekly reflections:* Participants reported various challenges related to determining the content of their journals, including the selection of their photos and the synthesis of their responses. Some participants reported that it was challenging to “narrow down” their photos and determine which

photos best "embodied" the selected weekly themes: "It was really fun taking all the pictures, but like, there were so many, so narrowing it down was a little bit of a challenge." Others referred to a difficulty in "formulating the words" for their reflections and synthesizing their thoughts, in both written and voice formats: "When voice recording about my experiences… I find it so hard to like narrow down my words and keep my words concise. Like keep my overall dialogue straight to the point." Further, some noted that it was challenging to determine the content of their reflections as the result of the ambiguity regarding the appropriate length for their responses: "I guess with writing…I was trying so hard to think of different ideas and how to connect them, but I felt like I really didn't say enough… I guess I wasn't sure how much to write." Others reported that it was challenging to recall the context associated with their photos when they completed their reflections and identified this as a source of worry during their participation in TP. b) *Reviewing and discussing experiences:* Although most participants enjoyed reviewing and discussing their photos and experiences, a small number indicated that they felt uncomfortable in this process. One participant reported that they found some of their photos to be "cringy" when reviewing them. Another participant highlighted that reviewing their photos occasionally led to rumination: "Sometimes it feels like you're ruminating you know; wishing that those kinds of moments [would] happen again." Finally, one participant reported that it was challenging to connect to their experiences while discussing their photos: "My biggest challenge was with actually talking about my photos. I am not really one to talk about myself or anything I have done. I don't enjoy that, like at all."

Benefits

Most participants identified at last one benefit related to their participation in TP reflecting a) hedonic and b) eudaimonic components of well-being. There was a lack of

agreement between quantitative and qualitative findings regarding changes in hedonic well-being, as in their qualitative reports numerous participants referred to increases in positive affect and reductions in symptoms related to mood and anxiety. With reference to eudaimonic well-being, qualitative reports mirrored quantitative findings, including increases in experiences of meaning and purpose, optimism, and connectedness.

Benefits related to hedonic well-being included: a) changes in experiences of positive affect; and b) changes in experiences of negative affect. *a) Changes in experiences of positive affect:* Several participants reported experiencing non-specific increases in positivity: "Overall it did help me be a bit more positive." Some participants referred the amplification of specific positive emotions, such as feeling more relaxed or excited about different aspects of TP including anticipating upcoming themes or engaging in photo-taking activities. Others noted that they felt happier: "I felt like I was happier in the moment more…and even out of the moment." Participants also reported that the use of photographs allowed them to cherish and "relive" happy memories. *b) Changes in experiences of negative affect:* There were also positive changes in experiences of negative affect, including reductions in negative mental health states, such as anxiety and stress: "I feel like it made my anxiety feel really good, like less." Some participants reported using new strategies to cope with stressors, such as redirecting their attention to positive experiences or re-evaluating the valence of different stressors, which allowed them to feel more "grounded" during adverse events. Others highlighted an increased acceptance of negative mental health states and the co-existence of the positive and negative aspects of their lives: "Like when I had more stress it was not because of this, and this helped with a lot of the stress that was from outside things… It's very nice and cool that like this is how good my life is even like with stressful things happening." One participant reported that although their negative mental health

states were not reduced, they felt more confident and their ability to cope: “I still felt stressed, like equally as stressed, but I felt more in control of the stress.” Further, some noted that they experienced new stressors during the month of the intervention, which made it challenging for them to evaluate any potential changes in negative mental health states: “It's kind of hard to say. When I first started it [TP], I was really enjoying it, so I would say yes [it decreased negative mental health states], but then I just I started struggling with my mental health, kind of just unrelated to the study …and so that kind of ran interference.”

Benefits related to eudaimonic well-being included: a) experiences of purpose and meaning; b) personal growth; c) optimism; and d) connectedness. *a) Purpose and meaning:* Several participants indicated that the creative expression through photography allowed them to experience a greater sense of purpose and meaning in their lives. Purpose was also experienced through the completion of the weekly goals and the awareness that they were contributing to research: “I felt like my contribution was valuable, and it also felt good to have, you know, a reason to be trying to find positive meaning.” Participants also reported that in identifying the presence of the domains in their lives, they found more meaning and value in their experiences. They referred to an increased awareness of the “positive aspects” of their lives and noticed that they started finding meaning and value in the “small things”. Some highlighted that TP prompted them to “stop and smell the roses” and allowed them to recognize the meaning in experiences which they may have otherwise discounted: “Just being on the lookout for the positive topics makes you more like cognizant of like, the positive stuff that is around you, that you sometimes don't think of much if you're feeling bad, or like if you're just busy.” Some participants indicated that their participation in TP prompted a narrative reconstruction: “I think the biggest benefit was … realizing that my life is truly not boring, and I do have moments that I want to capture and

remember." Similarly, another participant highlighted: "It [TP] fostered a greater appreciation for my little corner of the world." Finally, one participant referred to the importance of timing in identifying the impact of these meaning-making processes: "I think after I was done, I was like: 'Oh, I don't really feel any different.' And then a little bit after I was like: 'Oh, I actually do!' … I just subconsciously started recognizing those small things more often…There was actually an impact on that." *b) Personal growth:* There were also experiences of different aspects of personal growth, such as improvements in participants' capacity for introspection and greater insight regarding their emotions, thoughts, and behaviours: "I'm not good at journaling…but as soon as I started looking at these photos … I was like, '…This is why I did this. This is what I was feeling. This is why it was important.'" There was also an appreciation of the reflective process, with one participant indicating that it allowed them to identify the domains of life which they wished to "improve on" and several participants indicating that the use of photos helped them to remember their experiences, focus their reflections, and connect with their experiences: "I'm not good at journaling, and that's why, and I thought I would do maybe the voice a little bit more. But as soon as I started looking at these photos with the questions and running it back, I was like, 'Okay, well, this is not actually …that complicated'". Participants also reported increases in self-efficacy, with some indicating more confidence in their photography skills and others referring to a sense of achievement in meeting intervention demands: "I think having a goal to meet at the end of the week kind of made me feel more successful." Further, personal growth was reflected as a motivation to pursue new experiences: "I think it kind of inspired me to get out there and do stuff. And I'm actually doing a film challenge now that I probably wouldn't have signed up for without doing this." One participant highlighted how this increased self-knowledge prompted them to pursue more positive experiences: "I was able to identify my

feelings in certain situations more clearly and that then helped me value those situations more and seek them out more, so that was nice." *c) Optimism:* For some, becoming more aware of the positivity in their life gave them "hope" and led to an anticipation of future positive experiences: "It definitely reminded me of like the good times that I had during the week and that I was probably gonna have just as many photos in the next week to look forward to." One participant reported that despite the challenges that they were experiencing, they felt optimistic about their future progress: "Even though I might feel bad right now, I know that in general, things are going better. Like I'm on an upward slope, even though it's a difficult today." *d) Connectedness:* Photographing and reflecting on the connectedness theme prompted some participants to develop a greater appreciation of the positive relationships in their lives. One participant noted that they felt more "involved" in their community while another reflected that the supports in their lives became more salient: "I felt more supported the week I was taking the supportive photos because I was looking around for support my life." Similarly, one participant noted: "It did force me to be like: '…I need to give myself more credit for being connected than I originally thought.'"

Suggested Intervention Adaptations

Participants provided valuable suggestions to increase intervention feasibility, including: a) increased flexibility in intervention design; b) increased structure in intervention design; c) changes to the devices and media used to capture experiences of well-being; and d) additional external supports. Notably, in agreement with quantitative reports indicating high levels of intervention practicality, several participants also reported that the program was very supportive and did not suggest any changes or additional supports required for their participation.

Increased flexibility in intervention design: Suggestions for increasing the flexibility of the program fell into two subthemes: a) an individualized approach to theme selection; and b) a more

flexible reflective process. *a) An individualized approach to theme selection:* In accordance with reported challenges in identifying and capturing weekly themes, some participants proposed a more personalized approach to theme selection, which could be facilitated by removing some or all of the domains: "I understand why it was done with weekly topics, but I wonder whether there would be a way to make it more open. Some topics were harder to get photos for, and others were more beneficial to think about." In line with this individualized approach, others suggested the addition of more topics, such as "seasonal" topics or topics related to domains of negative mental health, or simply capturing positive or personally meaningful experiences, as opposed to specific domains. *b) A more flexible reflective process:* Participants also recommended a more flexible approach to the reflective journaling process. Corresponding to reported challenges related to adhering to weekly timeframes and opportunities for positive experiences, some participants suggested more flexible timelines for the completion of reflections and photo-uploads. One participant recommended: "Having to take 16 photos over the four weeks as opposed to like four each week. Just because like some weeks I got a lot more stuff and was happier." Others recommended more flexibility in weekly expectations. Some suggested a reduction of the number of required photo uploads, while others suggested uploading more photos: "I wish it had more of me. More photos, or to like (to) describe all of them, because that way I might have ripped more benefits from anything I did." Some participants also wanted more flexibility with journaling questions to facilitate a more authentic reflective process:

> I have like some thoughts about the photos, and I had to figure out how to make it work with the questions. And sometimes I just didn't know what to say in regard to the questions. They felt like kind of limiting or something… I think maybe [they] tried to direct my focus a bit in a way that I didn't have much to say.

Increased structure in intervention design: The intervention may also be improved by adding a more structured approach, including a) increased specificity in domain selection; and b) increased support with intervention procedures and demands. *a) Increased specificity in domain selection:* In contrast to the desire for a more flexible approach, some participants recommended the inclusion of more detailed and unambiguous definitions and examples of the selected topics. For example, it may be helpful to include examples of the physical sensations and emotions that are associated with topics to aid participants in identifying and differentiating experiences. These adaptations could be particularly relevant to autistic people: "…especially if it's therapeutic photography for autistic people specifically, it is a pretty common thing of not necessarily knowing how you feel." *b) Increased support with intervention procedures:* It may be helpful to provide "more in depth instructions", detailing how to complete the intervention. Some autistic people may appreciate a character limit for weekly reflections to guide them in evaluating the demands of the reflective process. Further, several participants indicated the inclusion of additional reminders to facilitate their participation in the intervention. More active involvement of the research team to facilitate the reflective process may also help with the challenges related to the reflective process, adhering to timelines, and remembering to capture experiences of well-being: "It helps people reflect if there's another person listening and waiting for someone to say something interesting."

Changes to devices and media used to capture experiences of well-being: Some participants noted that the use of smartphones could disrupt the therapeutic experience of photography and suggested that digital cameras could be used for photo taking. Other participants recommended the integration of additional media, such as videos and music, to capture and communicate experiences of well-being: "[I] would probably involve like videos if I could… when I'm

watching them, I see like the whole context behind it and I get really happy." Participants also suggested the use of a digital gallery dedicated to therapeutic photography, to facilitate easier access to photos and concentration on the reflective process. One participant noted that it would be helpful to have access to photos and reflections after submitting them: "It also might have been nice to also have a copy of the things that I wrote … so that I could save them and look at them later. That's something that I like about journaling." Finally, to address concerns related to recalling the context of photos during the reflective process, participants suggested the use of voice recordings or a notes application to record descriptions of experiences in the moment.

External supports: Some participants recommended the addition of external supports to facilitate engagement with the intervention. One participant noted that "being able to go places and take photos" with their mother would have increased experiences of well-being. Further, the "integration" of therapeutic photography with formal therapy was suggested as an additional means of support by some participants: "I think it would have been nice if I had enough money to see my therapist twice during this time: having one at the beginning and one at the end to kind of implement that into our progress." Finally, the development of a support group to facilitate the discussion of photographs and positive experiences was identified as a possible next step for the implementation of the intervention:

> Maybe like a support group to help like discuss your feelings… Just expanding it to involve more like community… For the purpose of this study, I think the study was fine, but like in the future…here are some ways I think this cannot just be a one-time thing, but like a lifestyle.

Discussion

This mixed-methods study presents an evaluation of the feasibility of a novel therapeutic photography intervention for the well-being of autistic emerging adults. Following a positive psychology approach, we adopted a multifaceted conceptualization of well-being, highlighting both the hedonic and eudaimonic domains, to compliment the dominant focus on negative mental health in the autism literature (Pellicano & Hayworth, 2023). Findings supported the feasibility of TP in terms of demand, implementation, acceptability, and practicality. Further, preliminary evidence suggests that TP can lead to improvements in facets of hedonic and eudaimonic well-being. Suggestions for future adaptations to better address the needs of autistic people were also explored. A key strength of the current intervention was its focus on taking the perspectives of autistic people in informing its relevance and design, thereby aligning with a recognized research priority in the autism literature (Shattuk et al., 2018).

Demand

High intervention demand was reflected in our pre-study consultation, successful recruitment efforts, and participants' self-reported interest in TP. These findings align with stakeholder reports recommending the development of self-guided interventions (Benevides et al., 2020) and interventions focusing on positive well-being outcomes for autistic people (McVey et al., 2023). Further, since the interest of autistic young people in strengths-based interventions is a key predictor of their engagement (Lee et al., 2024), these findings are also promising for the implementation of TP.

Implementation

Implementation was supported with high rates of participant adherence, engagement, and retention. This is noteworthy as challenges with attrition and low participant engagement have

been reported in other self-guided interventions for autistic young people (e.g., online cognitive behavioural programs, app-based mindfulness interventions (Wickberg et al., 2022; Guzick et al., 2023; Hartley et al., 2019). Further, although participants reported some challenges with the integration of TP in their daily lives, such as time management and remembering to engage in photo-taking, most found TP to be implementable, possible, and easy to use. Based on the literature on self-guided mental health interventions (e.g., Fisher et al., 2024; Gulliver et al., 2020), some factors that may have contributed to our favourable implementation outcomes include: the use of email reminders, flexible methodology (i.e., completion of post-intervention interviews and questionnaires remotely), reasonable financial incentives, participant interest, and low intervention demands.

Another important consideration for participant engagement in TP is the availability of photo-taking opportunities. Participants noted that it was challenging to engage with TP when they lacked opportunities to experience the assigned topics (e.g., Engagement, Perseverance, Optimism, Connectedness, and Happiness), and future work needs to assist participants when they are confronted with this situation. Strategies may involve prompting participants to upload and reflect on photos from past experiences or asking them to photograph aspects of their environment which they believe could support them in experiencing the assigned topics (e.g., if a participant is not feeling connected, they could photograph a community centre they may be interested to get involved with). According to participant suggestions, a more individualized approach to weekly intervention demands may also be a helpful accommodation during particularly stressful or uneventful weeks.

The issue of confidentiality must also be noted as a unique consideration in the implementation of photography-related interventions with autistic people. It is essential that

participants feel comfortable to photograph the environments that are meaningful to them; however, as indicated by participants' qualitative reports, this cannot always be assumed. Indeed, in a recent review of photo-elicitation studies, confidentiality was identified as one of the primary challenges reported by neurotypical participants (Buchan, 2020). Issues with confidentiality can also explain why 11.1% of participants reported stigma-related negative effects (i.e., feeling scared or ashamed that people might find out about their participants in the program); however, it should be noted that these negative effects were reported by a small number of participants and their impact was very low. This suggests that although confidentiality is an important consideration for TP, participant engagement in photo-taking activities is largely not harmful. Since some of these challenges may be unavoidable, it is important that they are reviewed and discussed in participant orientation sessions. For instance, in our participant orientation, we included detailed instructions and visual examples of appropriate and inappropriate photo-taking opportunities, explaining when permission might be needed when taking photos in public spaces. This approach can be particularly helpful for autistic people, who may experience challenges with the interpretation of social cues. Further focus on strategies to support the effective integration of therapeutic photography across different natural, built, and social environments in a similar fashion may be helpful.

Acceptability

Most participants liked, welcomed, approved, and found TP to be appealing. Participants favoured different aspects of the intervention, with photo-taking and reflection activities being the most commonly enjoyed components. Findings were mixed in terms of the *appropriateness* of TP. While most participants reported that TP aligned with their values and that it was applicable and a good match for them (some aspects of appropriateness), a smaller proportion

found TP to be suitable or fitting (63.9% and 58.3%, respectively). Our qualitative analysis suggests that this may be related to our conceptualization and explanation of well-being to participants. Although based on a non-developmental approach that was meant to focus on concepts that would not be impacted by the developmental challenges often experienced by autistic people (e.g., challenges with social development, academic or vocational achievement, or autonomy), this conceptualization may not have captured the full scope of well-being for autistic people, as it was not developed with autistic people. Indeed, participants noted that some of the selected constructs, such as Optimism and Perseverance, did not feel relevant or authentic to them. This is a commonly reported limitation of positive psychology studies in autism research, with several critiques highlighting the importance of collaborating with autistic people to define well-being instead of relying on neurotypical standards (Lam et al., 2021; Pellicano & den Hayworth, 2023; Robeyns, 2016). Although the current study is a step towards a paradigm shift in the autism intervention literature, the development of an autism-informed framework for well-being is a critical future direction for the design of positively oriented interventions for autistic people (Simpson et al., 2024).

Our investigation of negative effects is a significant strength of the current study as it has been identified as a research priority by autistic stakeholders (Shattuck et al., 2018). It is encouraging that while 41.7% of our participants attributed some negative effects to TP, the reported impact of those effects was rated as very low. Provided the general lack of adverse event reporting autism intervention research (Bottema-Beutel et al., 2021; Bottema-Beutel et al., 2023a), it is not possible to compare our results to those of other interventions for autistic young people. Regarding the types of negative effects that were reported, in addition to experiences of stigma (discussed above), participants reported increases in symptoms (e.g., stress) and concerns

about the quality of the intervention (e.g., understanding the intervention). Our qualitative analysis indicates that these effects were likely related to challenges with time-management and understanding the definitions for the selected domains of well-being. Participants suggested that more flexible deadlines and more psychoeducation related to different domains of well-being, or an individualized approach to the topic selection, would be helpful in fostering a better understanding of the intervention and facilitating higher acceptability. The potential of experiencing negative effects from TP highlights the importance of providing autistic young people with mental health resources in intervention research, such as a guide with community supports and helpline numbers, as part of their orientation, or someone to speak with if they experience distress.

Some participants also expressed concerns about the perceived effectiveness of the intervention when surveyed post-intervention. This was surprising since most participants gave clear examples of benefits when asked directly. One explanation for these contradictory findings may be related to what participants expected to occur as a result of the intervention. Most participants reported improvements in positive aspects of well-being, but not necessarily reductions in negative mental health states, and if participants expected change in the latter, they may have questioned the effectiveness of the program. This speaks to the importance of clarity in defining intervention goals and processes (Boyd et al., 2022); therefore, providing more guidance in terms of targeted intervention outcomes, may also be beneficial. Since treatment expectations are an important therapeutic factor for treatment outcomes in autistic young people (e.g., treatment efficacy, engagement, and adherence; Albaum et al., 2023), exploring these relationships would be a valuable future research direction. Several other individual-level factors that were not examined in this study may have also influenced participants' perceptions of

effectiveness. For example, in a study exploring the feasibility of a remote intervention for autistic young people, Adams et al. (2023) reported that individual-level characteristics, such as experience with mainstream interventions, comfort with technology, home environment, social communication skills, and attention span, were related to the perceived effectiveness and overall acceptability of the intervention. Future research could explore how individual factors may influence judgements of intervention acceptability.

Practicality

Most participants reported that they had access to the resources necessary for participating in TP (i.e., a smartphone with a camera and a computer for reflection uploads), did not have to give up resources to participate in TP, and that the amount of effort that had to put into TP was acceptable. This is noteworthy since accessibility and cost-effectiveness were a priority in designing the intervention. Since practicality is tightly coupled with intervention engagement and acceptability (Proctor et al., 2010), these findings further align with the observed implementation and acceptability outcomes. Some participants identified that the completion of weekly reflections was challenging, such as synthesizing their thoughts, discussing their emotions, and picking photos for weekly reflections. These challenges are commonly reported with TP interventions; however, because they are considered to be manageable and most participants are able to work through them independently, they have been found to lead to experiences of achievement and self-efficacy (Gibson, 2018); something that was also reported by participants. Some factors that may have facilitated the completion of weekly reflections in the current study included the option for voice recordings, the integration of photos in the reflective process, and participants' appreciation of their increased capacity for introspection.

Participants also suggested the integration of additional supports to facilitate the practicality of TP. Some suggested more active participation from the research team or the integration of TP with other therapeutic services. This is similar to preferences reported by non-autistic young people for the delivery of self-guided mental health interventions (e.g., Anstiss & Davies, 2015). An accessible and cost-effective way for supplementing TP with these supports could be the use of single-session interventions (SSIs). Single session interventions are "specific, structured programs that intentionally involve just one visit or encounter with a clinic, provider, or program" (Schleider et al., 2020, p.265), and have been linked to improvements across different mental health outcomes, such as depression and anxiety, among autistic and non-autistic young people (e.g., Calvete et al., 2019; Cartwright-Hatton et al., 2018; Gerber et al., 2024). The addition of an SSI targeting positive mental health prior to, or following, TP may be a promising future direction. Further, some suggested the use of a group format to benefit from peer support, which has been found to be helpful in other interventions (eg., Bottema et al., 2023b; Oswald et al, 2018; Bemmer et al., 2021).

Limited Efficacy

Participants reported improvements in both hedonic and eudaimonic well-being post-intervention. In terms of hedonic well-being, although statistically significant changes were not observed on quantitative measures of happiness (i.e., EPOCH Happiness subscale), mood (i.e., PHQ9), and anxiety (GAD-7), the majority of participants reported increases in positive affect and decreases in negative affect in their qualitative reports. Regarding changes in positive emotions, since most participants indicated general increases in positive affect, as opposed to increases in specific positive emotions, the EPOCH Happiness scale may have been too narrow to capture changes in positive affect. Future research may employ more broad measures for the

evaluation of positive emotions (e.g., the PERMA Profiler Positive Emotions subscale). In terms of mood, although changes were not significant on the PHQ-9, a medium effect size was observed (*d*= -.31), which might suggest that our sample size was too small to detect statistically significant changes (Sullivan & Feinn, 2012). Further, significant changes in anxiety were also not reported; however, these findings may be confounded by experiences of different stressors as participants reported experiencing several stressors during their participation in TP and the frequency of those stressors was negatively associated with reductions in anxiety post-intervention. Provided the high incidence of stressors reported by participants, it is encouraging that anxiety scores did not increase post-intervention, which may indicate that TP could have helped participants cope with these stressors. Indeed, several participants indicated that they developed new coping strategies in their qualitative reports. The potential of TP to increase coping self-efficacy is noteworthy and should be investigated in future research, particularly given the large number of stressors experienced by autistic emerging adults in their transition to adulthood (Cheak-Zamora & Odunleye, 2022). Finally, since longer positive psychology interventions are associated with larger reductions in negative mental health symptoms (Carr et al., 2021), future studies could explore the optimal length of positive mental health interventions for autistic young people.

Improvements across several facets of eudaimonic well-being were also observed in quantitative and qualitative findings. With reference to quantitative findings, the observed effect sizes were comparable to those found in other positive psychology interventions for the well-being of non-autistic people; typically ranging from small to medium (Carr et al., 2021). The largest improvements were observed in experiences of meaning and purpose. Indeed, the potential of photography to facilitate meaning-making was highlighted in recent review of

therapeutic benefits for photo-elicitation studies with neurotypical people with mental health challenges (Buchan, 2020). Significant improvements were also found across full-scale EPOCH scores, and Engagement and Connectedness subscale scores, when controlling for IQ. Since, TP requires participants to be immersed in their experiences in order to connect them to different meanings (Gibson, 2018), it was not surprising that participants reported increases in their level of engagement across different activities. This was also highlighted in qualitative reports as participants noted that the intervention prompted them to "stop and smell the roses" and attend to different aspects of their experiences. These aspects may also suggest increases in mindfulness, which may be explored as a mechanism of change in future research. Further, the observed increases in Connectedness are very encouraging as the maintenance and creation of meaningful relationships is reported are both a challenge and intervention priority for autistic young people (Tesfaye et al., 2023). Changes in Optimism also approached significance, while changes in Perseverance were not significant; however, these findings are challenging to interpret provided the low internal consistency of the Perseverance subscale at baseline (Cronbach's $\alpha = 0.58$). Future research may investigate different meanings of perseverance among autistic people and their relationship, or lack thereof, with definitions of well-being. Finally, participants reported different aspects of personal growth in their qualitative reports, such as increases in self-knowledge and self-exploration. These findings support the relevance of the intervention for autistic young people, as these aspects of personal growth are considered developmental milestones in emerging adulthood (Arnett et al., 2000). Within this context of self-growth, future research may investigate the potential of employing TP to facilitate the development of positive autistic identities, which has been indicated as an integral aspect of well-being for autistic people (Corden et al., 2021).

Provided the established association between negative and positive mental health in the literature (Keys, 2005), it was surprising that baseline mood and anxiety as well as changes in mood and anxiety were not significantly correlated with changes in any of the examined positive facets of well-being (i.e., Engagement, Perseverance, Optimism, Connectedness, Happiness, and meaning and purpose). This may suggest that the conceptualization of these two dimensions of well-being may vary for autistic people, further warranting research on an autism-informed definition of well-being. It is also important to note the observed relationship between FSIQ and changes in EPOCH-related outcomes as it may indicate that the current intervention design may not be developmentally appropriate for people with ID and warrants further investigation. Finally, the relationships between change scores (i.e., anxiety, EPOCH full scale Engagement, and Happiness) and perceptions of implementation, acceptability, and appropriateness, further highlight the importance of investigating feasibility outcomes in novel interventions with autistic young people, which should be further integrated in the autism literature.

General Intervention Adaptations

Finally, participants highlighted the need for an individualized approach to TP. Some participants wanted a more structured approach, including specific definitions and examples of well-being, detailed guidelines for reflections, and additional email reminders. Others preferred a more flexible approach, including personalized theme choices, a lack of limitations in the reflective process, and accommodating deadlines. Individualized approaches in self-guided interventions are generally favoured by young people (Achilles et al., 2020) and may be particularly meaningful for autistic young people, provided the heterogeneity of their needs (Westberg et al., 2021). An individualized approach for TP may entail presenting participants with the option of choosing between a structured or flexible intervention option. Notably, choice-

making has been reported to foster positive outcomes for intervention implementation, acceptability, and engagement (Batterham et al., 2018). Participant-centered approaches can also lead to empowerment and increased perceptions of autonomy and self-determination among autistic young people (Ryan et al., 2024), all of which have been indicated as intervention priorities for this population (Jones et al., 2023; Tesfeye et al.,2023). Further, since choice-making and planning are integral parts of transitioning to adulthood, this approach would be especially beneficial and developmentally relevant for autistic emerging adults (White et al., 2024). Future research may explore the potential benefits of this adaptation across different feasibility outcomes and the role of individual characteristics (e.g., age, support needs, clinical symptoms) in shaping autistic young people's preferences for structured or flexible approaches.

Limitations and Future Directions

The present study includes several limitations worth considering. First, the psychometric properties of one of our primary outcome variables (i.e., the EPOCH) have not been validated with autistic young people. Second, participants reported several benefits which were not captured by the included outcome measures, such as improvements in self-knowledge and coping self-efficacy. Provided the novelty of TP, future research my employ a more comprehensive approach to measure selection, to holistically explore the potential benefits of TP. Third, our study had a small size and lacked a control group, both of which are inherent limitations of feasibility studies. Considering our findings, a larger randomized-control trial is indicated to further investigate the efficacy of TP. Fourth, although there was considerable variability in the demographic and clinical characteristics of our participants, including mental health diagnoses and support needs, our sample was largely limited to autistic young people without intellectual disability, though we did not make this an exclusionary criterion and

participants were able to involve support people in the project (only10 participants involved a support person, and only one participant was noted to have an ID). This significantly limits the generalizability of our findings. Recognizing this limitation is particularly meaningful, as the frequent exclusion of people with ID in autism research has contributed to a misrepresentation of the heterogeneity of the autistic community and is associated with several ethical concerns (Rusell et al., 2019; Cascio et al., 2021). Consultations with stakeholders will be necessary to inform relevant adaptations and more inclusive recruitment strategies for autistic people with ID. A fifth consideration concerns participants' access to technology. The majority of participants in the current study reported that they had access to a photo-taking device; however, this cannot be assumed for all autistic people. Participants also required internet access to upload their reflections, which may pose an additional accessibility barrier.

Finally, given the exploratory nature of our study and general ambiguity in the positive psychology intervention literature, we did not investigate any potential mechanisms of change related to the observed improvements in well-being. Notably, participant reports mirror several aspects of savouring (i.e., attending to and appreciating positive experiences), which has been linked to the promotion of different facets of hedonic and eudaimonic well-being among neurotypical adolescents (Chadwick et al., 2021). It will be important for future intervention research to investigate savouring along with other potential mechanisms of change and their relationship with different intervention outcomes among autistic young people.

Conclusion

Therapeutic photography is a promising novel intervention for the promotion of well-being for autistic young people. Our findings indicate that TP is a highly feasible intervention in terms of demand, implementation, acceptability, practicality, and limited efficacy. Future

adaptations of the intervention may include the development of a more individualized approach to participant involvement, the use of additional media, and increased community involvement. Future research efforts should be invested in the development of an autism-specific framework for well-being and prioritize the recruitment autistic people with ID. The mechanisms of change associated with TP is another important avenue for future research endeavours.

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Appendix A: Feasibility Outcomes

Table A1

Results for Implementation and Acceptability Measures (N=36)

Measure	Item	*n(%)* disagree	n*(%)* neutral	*n(%)* agree
FIM	TP seems easy to use.	2 (5.6)	0	34 (94.4)
	TP seems doable.	1 (2.8)	1 (2.8)	34 (94.4)
	TP seems possible.	2 (5.6)	5 (13.9)	32 (88.9)
	TP seems implementable.	1 (2.8)	5 (13.9)	30 (83.3)
AIM	I like TP.	2 (5.6)	4 (11.1)	30 (83.3)
	I welcome TP.	2 (5.6)	4 (11.1)	30 (83.3)
	TP is appealing to me.	5 (13.9)	2 (13.9)	29 (80.6)
	TP meets my approval.	2 (5.6)	4 (11.1)	30 (83.3)
IAM	TP seems like a good match.	2 (5.6)	4 (11.1)	30 (83.3)
	TP seems applicable.	2 (5.6)	4 (11.1)	30 (83.3)
	TP seems suitable.	5 (13.9)	8 (22.2)	23 (63.9)
	TP seems fitting.	5 (13.9)	10 (27.8)	21 (58.3)

Note. FIM = Feasibility of Intervention Measure; AIM = Acceptability of Intervention Measure; IAM = Intervention Appropriateness Measure; TP = Therapeutic Photography.

Table A2

Quantitative Indicators of Feasibility Metrics by Domain

Feasibility domain	Criteria evaluated	Results	A priori criteria
Demand	% participants reporting being at least "interested" in TP	75.7% pre-study survey 78% baseline	> 70
	n recruited participants between June 2023 and January 2024	*n* = 41	*n* = 25
Implementation	% participants who completed 2/3 of the intervention	90.2%	-
	% intervention participants who completed all four weeks of the intervention	82.9%	> 70%
	average proportion of completed reflections (out of 16) across all weeks	81.3%	> 70%
	% participants who participated in some aspect of the post-intervention assessment	90.2%	> 60%
	% participants reporting at least 'agree' on each item on the FIM	Range: 83.3 – 94.4% 83.3% implementable 88.9% possible 94.4% doable 94.4% easy to use	> 80%
Acceptability	% of participants reporting any concerns in pre-study survey	12.7%	< 15%
	% of participants reporting at least 'agree' on each item on the AIM	Range: 77.8 – 83.3% 83.3% like 83.3% welcome 80.6% find appealing 77.8% meets approval	> 80%
	% of participants reporting at least 'agree' on each item on the IAM	Range: 58.3% - 83.3% 83.3% good match 77.8% applicable 63.9% suitable 58.3% fitting	> 80%
	% of participants reporting at least 'agree' on IAS items for positive attitudes, values, and perceived effectiveness	Range: 50% - 86.1% 86.1% positive attitudes 77.8% values 50% perceived effectiveness	> 80%

Feasibility domain	Criteria evaluated	Results	A priori criteria
	% of participants reporting at least one intervention-related negative effect on the NEQ	41.7%	<10%
	% of participants reporting intervention-related negative effects according to five NEQ factors	Range: 0 - 25% 25% symptoms 22% quality 11.1% stigma 8.3% hopelessness 0% dependence	-
Practicality	% of participants with access to needed technology	94.4% computer 100% camera	-
	% of participants reporting at least moderately "comfortable" taking photos with their devices	97.2%	> 70%
	% of participants reporting at least "agree" on IAS items for opportunity cost and burden	94.4% opportunity cost 80.6% burden	> 80%

Note. TP = Therapeutic Photography; FIM = Feasibility of Intervention Measure; AIM = Acceptability of Intervention Measure; IAM = Intervention Appropriateness Measure; IAS = Implementation Acceptability Scale; NEQ = Negative Effects Questionnaire