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Daydreaming and grandiose delusions: development of the Qualities of Daydreaming Scale

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Abstract

Background: Daydreaming may contribute to the maintenance of grandiose delusions. Repeated, pleasant and vivid daydreams about the content of grandiose delusions may keep the ideas in mind, elaborate the details, and increase the degree of conviction in the delusion. Pleasant daydreams more generally could contribute to elevated mood, which may influence the delusion content.
Aims: We sought to develop a brief questionnaire, suitable for research and clinical practice, to assess daydreaming and test potential associations with grandiosity.
Method: 798 patients with psychosis (375 with grandiose delusions) and 4518 non-clinical adults (1788 with high grandiosity) were recruited. Participants completed a daydreaming item pool and measures of grandiosity, time spent thinking about the grandiose belief, and grandiose belief conviction. Factor analysis was used to derive the Qualities of Daydreaming Scale (QuOD) and associations were tested using pairwise correlations and structural equation modelling.
Results: The questionnaire had three factors: realism, pleasantness, and frequency of daydreams. The measure was invariant across clinical and non-clinical groups. Internal consistency was good (alpha-ordinals: realism = 0.86, pleasantness = 0.93, frequency = 0.82) as was test–retest reliability (intra-class coefficient = 0.75). Daydreaming scores were higher in patients with grandiose delusions than in patients without grandiose delusions or in the non-clinical group. Daydreaming was significantly associated with grandiosity, time spent thinking about the grandiose delusion, and grandiose delusion conviction, explaining 19.1, 7.7 and 5.2% of the variance in the clinical group data, respectively. Similar associations were found in the non-clinical group.
Conclusions: The process of daydreaming may be one target in psychological interventions for grandiose delusions.

Keywords: Daydreaming; Fantasy elaboration; Grandiose delusions; Psychosis

Introduction

Grandiose delusions are inaccurate beliefs that one has special powers, wealth, mission, or identity (Leff *et al.*, 1976). This delusion type is relatively common, occurring in up to a third of people diagnosed with non-affective psychosis (Garety *et al.*, 2012) and up to 60% of people diagnosed with mania in the context of bipolar disorder (Goodwin and Jamison, 1990). However, there has been very little empirical research specifically on grandiose delusions. Although three-quarters of

patients identify harms associated with their grandiose delusions (Isham *et al.*, 2023), there is no evidence-based, theoretically driven, psychological intervention specifically for such experiences. In this paper we investigate a potential driver of grandiose delusions: daydreaming. We report the development of a self-report measure of daydreaming and assess potential associations with grandiosity.

Several putative maintenance factors of grandiose delusions have been identified, including the importance of the meaning inherent in the beliefs, reasoning biases, the content of hallucinations, immersion behaviours, and repetitive thinking about the belief (Bortolon *et al.*, 2019; Garety *et al.*, 2005; Isham *et al.*, 2021; Isham *et al.*, 2022). Daydreaming may also be a factor. Daydreaming – also referred to as mind wandering or fantasising – has been defined as a train of thoughts or images that occur when one's attention drifts away from external tasks and perceptual input towards a more private stream of consciousness (McMillan *et al.*, 2013). It is a widespread phenomenon. Estimates suggest that people typically spend 30–60% of their time engaged in daydreaming (Poerio and Smallwood, 2016). Daydreaming can occur both automatically and volitionally, can feature positive or negatively oriented content, and can be focused on past, present, or future experiences (real or imagined).

For many people daydreaming is adaptive, bringing such benefits as pleasure, relief from boredom, enhanced social skills, and improved creativity and problem solving (Baird *et al.*, 2012; Poerio and Smallwood, 2016; Singer and Antrobus, 1963; Smith, 1981). For a minority of people it can become problematic however, interfering with academic, interpersonal and vocational functioning (Somer, 2002). Fantasy proneness is a tendency towards a style of daydreaming characterised by fantastical thinking and a disposition towards vivid mental imagery, psychic experience, and an overactive creative imagination (Tan *et al.*, 2019). It has been found to be associated with higher levels of depression and dissociation, and also with delusion severity, pre-occupation, conviction, and distress in patients with affective and non-affective psychosis diagnoses (Tan *et al.*, 2019).

Daydreaming could play a role in the occurrence of grandiose delusions via several routes. First, it may be that the grandiose ideation itself features as the content of daydreams. The initial genesis of the grandiose belief, as well as its ongoing elaboration, may come directly from the content of pleasant daydreams. In this case we might expect those who have more pleasant and frequent daydreams to experience more frequent thoughts about the grandiose belief, keeping these ideas at the forefront of the mind and increasing delusional conviction. Similarly, a propensity for particularly vivid and perceptually realistic daydreams might make the content of such thoughts seem more believable, and thus also be associated with increased delusional conviction. Alternatively, even when the content of daydreams is not focused on the grandiose belief itself, experiencing more frequent and pleasant daydreams could generate increased positive affect which, in line with a mood-congruent theory of grandiose delusions (Freeman and Garety, 2003; Garety *et al.*, 2012; Smith *et al.*, 2005), may act to reinforce or amplify pre-existing inflated or accurate positive perceptions of the self which in turn feed into the grandiose content of a delusional belief. As such, daydreaming could potentially act both at the onset and in the maintenance of grandiose delusions via direct and indirect routes.

The possibility of daydreaming contributing to the maintenance of grandiose delusions is consistent with findings from a recent non-clinical experimental study. A total of 109 individuals were asked to recall a past experience during which they had felt special, important, or superior to most people (a grandiosity induction). Half of the participants were then instructed to dwell on how they were feeling, and the extent to which they had felt special or superior to others at the time of the experience being recalled, and the other half participated in a distraction task. Current grandiosity was assessed before and after the experimental task. Compared with distraction, the rumination condition was associated with the maintenance of current grandiose ideation (Cohen's $d = 1.15$; Bortolon and Raffard, 2021). The association between daydreaming and grandiose delusions has yet to be investigated in a clinical population.

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In this study we aimed (i) to develop a quick and easy-to-use questionnaire to assess the qualities of daydreams (perceptual realism, pleasantness, and frequency); (ii) to determine the extent to which daydreaming is reported by patients with grandiose delusions in the context of psychosis compared with patients with psychosis without grandiose delusions, non-clinical individuals with high grandiosity, and non-clinical individuals with low grandiosity; and (iii) to assess whether daydreaming is associated with higher levels of grandiosity, time spent thinking about grandiose delusions, and grandiose belief conviction.

Method

Study design and participants

We conducted a cross-sectional questionnaire study with two cohorts. In the clinical cohort, participants were recruited from 39 NHS mental health trusts across England and Wales. Inclusion criteria were: aged 16 years or older, accessing adult secondary care NHS mental health services, and diagnosed with non-affective or affective psychosis. Exclusion criteria were insufficient English to participate or a primary diagnosis of drug or alcohol disorder, personality disorder, or organic syndrome. Participants provided informed consent and data were collected in person or online via Qualtrics (Qualtrics, 2019). The non-clinical cohort was recruited via social media advertisements. Inclusion criteria were: aged 18 years or older, having internet access, and UK/ROI nationality or residence. There were no exclusion criteria. Participants provided informed consent online. Data were collected using Qualtrics. Consecutive participants in the clinical group with grandiose delusions were invited to participate in a follow-up assessment one week later to gather repeat data to assess test–retest reliability. The study design and interpretation of results were conducted in conjunction with members of a lived experience advisory panel (LEAP).

Measures

The Qualities of Daydreaming Scale (QuOD)

We developed an item pool to measure daydreaming via review of the literature concerning daydreaming, fantasising, and imaginal processes, and by adapting items from existing associated measures. Items were chosen to have a focus on current (as opposed to childhood) experiences and to examine qualities of daydreaming that we thought might be particularly relevant to grandiose delusions (i.e. perceptual realism, frequency, and positive content of daydreams). The initial item pool consisted of 15 items (see Table S1 in the Supplementary material), with each rated on a 5-point Likert scale (0 = do not agree, 4 = agree totally).

Grandiosity

The Specific Psychotic Experiences Questionnaire-Grandiosity subscale (SPEQ-G; see Supplementary material) is a self-report measure of grandiosity with good psychometric properties (Ronald *et al.*, 2014). Respondents indicate how much they agree with eight statements in relation to the last month, answering on a 4-point Likert scale (0–3). Higher scores indicate higher levels of grandiosity. The internal reliability of the scale was satisfactory in the non-clinical cohort (Cronbach's $\alpha = 0.72$) and good in the clinical cohort (Cronbach's $\alpha = 0.82$).

Time spent thinking about grandiose beliefs and grandiose belief conviction

In both clinical and non-clinical groups, participants with high grandiosity (≥5 on the SPEQ-G) were asked to write down a brief description, in one or two sentences, of their specific 'experience of feeling exceptional' (i.e. the grandiose belief). They were then asked to rate on a 0–100% scale

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their current conviction in this belief and how many hours each day on average that they spent thinking about their exceptional abilities, identity, role, mission, or wealth (ratings were on a 0 to 5 scale where 0 is 0–4 hours, 1 is 5–8 hours, 2 is 9–12 hours, 3 is 13–16 hours, 4 is 17–20 hours, and 5 is 21–24 hours). The cut-off of ≥5 on the SPEQ-G was consistent with Isham *et al.* (2022), and corresponds to the top 15th percentile of SPEQ-G scores in a non-clinical sample (Černis *et al.*, 2021). In the clinical group, participants were supported in the completion of the measures by clinical studies officers who had received training on eliciting grandiose delusions.

Data analyses

Analyses were conducted in R version 4.3.2 (R Core Team, 2023) with packages 'psych' (version 2.0.9; Revelle, 2020) and 'lavaan' (version 0.6-9; Rosseel, 2012). For measure development prior to factor analysis, Bartlett's test of sphericity (Bartlett, 1954) and the Kaiser-Meyer Olkin measure of sampling adequacy (KMO; Kaiser, 1974) were used to check for the feasibility of factor recovery based on the observed dataset. Parallel analysis based on polychoric correlations (assuming ordinal data) was used to identify the number of factors to retain. Retention of factors was based on comparisons between the eigenvalues of the observed data and random data (Ruscio and Roche, 2012).

Cohorts were randomly split to generate two subsamples, enabling item pool refinement using exploratory factor analysis (EFA) with the first subsample, and a test of factor structure using confirmatory factor analysis with the second subsample. Data from the non-clinical and clinical cohorts were combined. The first subsample consisted of 1883 non-clinical and 385 clinical participants, and the second consisted of 1884 non-clinical and 385 clinical participants.

Measurement invariance analysis was used to assess whether the measure performed similarly across the non-clinical and clinical groups. Psychometric properties were assessed using ordinal alpha to determine internal consistency (Gadermann *et al.*, 2012; Zumbo *et al.*, 2007) and intra-class correlations (ICC) for one-week test–retest reliability.

The extent to which items on the QuOD were endorsed by participants was inspected by dichotomising responses on each item to either 'not endorsed' [if the participant answered 0 (do not agree) or 1 (agree a little)] or 'endorsed' [if the participant answered between 2 (agree moderately) and 4 (agree)]. The numbers of participants endorsing each item are reported for each of four subgroups: a clinical group with grandiose delusions, a clinical group without grandiose delusions, a non-clinical group with high grandiosity (SPEQ-G>=5), and a non-clinical group with low grandiosity (SPEQ-G<5).

Kruskal-Wallis one-way ANOVAs and *post-hoc* pairwise Wilcoxon tests using the Benjamini-Hochberg correction for multiple testing were used to examine differences in mean factor scores for the daydreaming questionnaire across the four groups. Pairwise associations between daydreaming and grandiosity severity, time spent thinking about the grandiose belief, and grandiose belief conviction were tested using simple correlations, using factor scores for latent variables and raw scores for time spent thinking about the grandiose belief and grandiose belief conviction. Pearson's correlation was used except for testing associations with time spent thinking about the grandiose belief when a Spearman's correlation was used due to the ordinal nature of the variable. Structural equation modelling delivered final prediction models incorporating multiple predictors. Further methodological details are provided in the Supplementary material.

Results

Participants in the non-clinical cohort were recruited between 28 August 2020 and 21 November 2020, and those in the clinical cohort were recruited between 22 March 2021 to 3 March 2022. A total of 4537 participants (3767 from the non-clinical group and 770 from the clinical group) provided complete questionnaire item pool data. The socio-demographic information for these

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participants is summarised in Table 1. Socio-demographic information for all participants (i.e. including those who did not provide complete item pool data) is provided in Table S2 of the Supplementary material.

Part 1. Measure development

Prior to EFA, inspection of the correlation matrix for the first subsample led to removal of one item, Q14 ('*I daydream about the things that I want happening to me in the future*'), which was highly correlated (Spearman's rho = 0.89) with Q12 ('*I daydream about what I would like to see happen in the future*') and judged to have a similar (but slightly narrower) meaning. Bartlett's test of sphericity and KMO tests indicated factor analysis as appropriate ($\chi^2(105) = 30280.31$, $p<0.0001$; KMO = 0.94).

Parallel analysis indicated a multiple factor (2-, 3- or 4-factor) model may be most appropriate, but as the largest eigenvalue was nine times the size of the next largest the possibility of a simple one-factor solution was also considered. After model comparison the 3-factor solution (mapping onto constructs of 'pleasantness of daydreams', 'perceptual realism of daydreams' and 'frequency of daydreams') was identified as most appropriate from a theoretical and empirical perspective. The between-factor correlation coefficients indicated these as related but not synonymous constructs (pleasantness and realism, $r = 0.62$; pleasantness and frequency, $r = 0.62$, realism and frequency, $r = 0.69$). Following criteria for item removal, exploratory factor analysis led to the removal of three items which did not fit closely with the factor definitions. Another item (Q4, '*I often confuse my daydreams with real memories*') was considered for removal as it cross-loaded onto both the 'realism' and 'frequency' factors. It was decided to retain this item, however, as it had a good theoretical fit with the realism factor, strong clinical utility, and could be removed at CFA stage if it continued to be problematic. After EFA, the 11-item, 3-factor model accounted for 73% of the variance in the data (see Table S3 in the Supplementary material for factor loadings). The between-factor correlation coefficients were: pleasantness and realism, $r = 0.62$; pleasantness and frequency, $r = 0.61$; realism and frequency, $r = 0.65$.

CFA in the second subsample ($n = 2269$) showed that the 11-item, 3-factor model derived from the EFA (placing Q4 with the realism factor) had fit indices: scaled-$\chi^2(41) = 706.510$, CFI = 0.987, TLI = 0.983, RMSEA = 0.085, SRMR = 0.035. The RMSEA was slightly above the threshold of 0.08, which could be due to the residual impact of the non-normal distribution of the data. Nonetheless, given that the SRMR is considered a better fit index for categorical data compared with the RMSEA (Shi *et al.*, 2019; Xia and Yang, 2019), we determined that the QuOD had a good fit to the data. The pattern of factor correlations supported a higher-order factor. Results from the higher-order confirmatory factor analysis showed that the three primary factors loaded significantly onto the higher-order factor (standardised factor loadings were: pleasantness 0.81, frequency 0.94, and realism 0.87). Figure 1 shows the final model. The correlations between the QuOD factor scores and raw scores were very high (realism $r = 0.94$, pleasantness $r = 0.98$, frequency $r = 0.91$, higher order daydreaming = 0.96).

Measurement invariance

Using the CFA sample ($n = 2269$) we tested four levels of measurement invariance between the clinical ($n = 385$) and non-clinical ($n = 1884$) groups. Measurement invariance was achieved at the strongest scalar level (see Table S4 in the Supplementary material), meaning that the measure performed the same across the two groups, and that latent factor scores can meaningfully be compared between these groups. There was no significant difference between factor means in the clinical and non-clinical groups (within each of these groups participants were included across the full spectrum of grandiosity severity). Setting the non-clinical group as the reference group,

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Table 1. Socio-demographic and clinical data for participants in the measure development analyses

		Non-clinical group ($n = 3767$)	Clinical group ($n = 770$)	Clinical group test–retest ($n = 109$)
Age				
Mean (*SD*)		45.17 (18.9)	43.2 (13.7)	41.6 (12.7)
Gender	Female	2379 (63.2)	300 (39.0)	39 (35.8)
n (%)	Male	1283 (34.1)	460 (59.7)	68 (62.3)
	Non-binary	81 (2.2)	5 (0.6)	1 (0.9)
	Other/prefer not to say	24 (0.6)	5 (0.6)	1 (0.9)
Ethnicity	White (any)	3390 (90.0)	593 (77.0)	75 (68.8)
n (%)	Black (any)	26 (0.7)	70 (9.1)	16 (14.7)
	Asian (any)	104 (2.8)	51 (6.6)	8 (7.3)
	Multiple or multiple ethnic group/other	189 (5.0)	55 (7.1)	10 (9.2)
	Prefer not to say	58 (1.5)	1 (0.1)	0
Marital status	Single	1370 (36.4)	523 (67.9)	79 (72.4)
n (%)	Cohabiting	459 (12.2)	36 (4.7)	7 (6.4)
	Married/civil partnership	1445 (38.4)	108 (14.0)	5 (4.6)
	Separated/divorced	317 (8.4)	91 (11.8)	15 (13.8)
	Widowed	117 (3.1)	12 (1.6)	3 (2.8)
	Prefer not to say	59 (1.6)	0	0
Employment	Employed full-time	979 (26.0)	75 (9.8)	10 (9.2)
n (%)	Employed part-time	489 (13.0)	55 (7.2)	4 (3.7)
	Housewife/husband	71 (1.9)	10 (1.3)	2 (1.8)
	Retired	771 (20.5)	63 (8.2)	6 (5.5)
	Student	745 (19.7)	33 (4.3)	2 (1.8)
	Self-employed	365 (9.7)	17 (2.2)	0
	Unemployed	286 (7.6)	469 (61.1)	81 (74.3)
	Voluntary work (option in clinical group only)	—	46 (6.0)	4 (3.7)
	Prefer not to say	61 (1.6)	0	0
SPEQ-G total				
Mean (*SD*)		4.5 (4.3)	6.2 (6.2)	12.1 (5.6)
Range		0–24	0–24	5–24
Hours per day spent thinking about the grandiose belief (where present)	0–4 hours	1159 (30.8)	169 (21.9)	56 (51.4)
	5–8 hours	116 (3.1)	66 (8.6)	24 (22.0)
	9–12 hours	47 (1.2)	35 (4.5)	6 (5.5)
n (%)	13–16 hours	22 (0.6)	16 (2.1)	5 (4.6)
	17–20 hours	9 (0.2)	16 (2.1)	5 (4.6)
	21–24 hours	21 (0.6)	55 (7.1)	13 (11.9)
	Not applicable (no grandiose belief)	2393 (63.5)	413 (53.6)	—
Grandiose belief conviction 0–100% (where a grandiose belief was present)				
Mean (*SD*)		66.1 (25.6)	67.2 (31.4)	69.1 (30.4)
Range		0–100%	0–100%	0–100%
History of mental health difficulties?	Yes	1844 (49.0)	—	—
n (%)	No	1838 (48.8)	—	—
	Prefer not to say	85 (2.3)	—	—
If yes are these ongoing?	Yes	1154 (62.6)	—	—
n (%)	No	650 (35.2)	—	—
	Prefer not to say	40 (2.2)	—	—
Diagnosis	Schizophrenia	—	270 (35.1)	39 (35.8)
n (%)	Schizoaffective disorder	—	119 (15.5)	24 (22.0)
	Delusional disorder	—	17 (2.2)	2 (1.8)
	Brief psychotic disorder	—	13 (1.7)	3 (2.8)
	Psychotic disorder NOS	—	154 (20.0)	18 (16.5)
	Bipolar affective disorder	—	184 (23.9)	23 (21.1)
	Psychotic depression	—	8 (1.0)	0
	Other	—	5 (0.6)	0

(*Continued*)

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Table 1. (*Continued*)

		Non-clinical group ($n = 3767$)	Clinical group ($n = 770$)	Clinical group test–retest ($n = 109$)
MH service recruited from *n* (%)	In-patient unit	—	142 (18.4)	19 (17.4)
	Forensic in-patient	—	25 (3.2)	8 (7.3)
	EIP service	—	139 (18.1)	20 (18.3)
	Adult CMHT	—	425 (55.2)	57 (52.2)
	Forensic adult CMHT	—	5 (0.6)	1 (0.9)
	Other	—	34 (4.4)	4 (3.7)

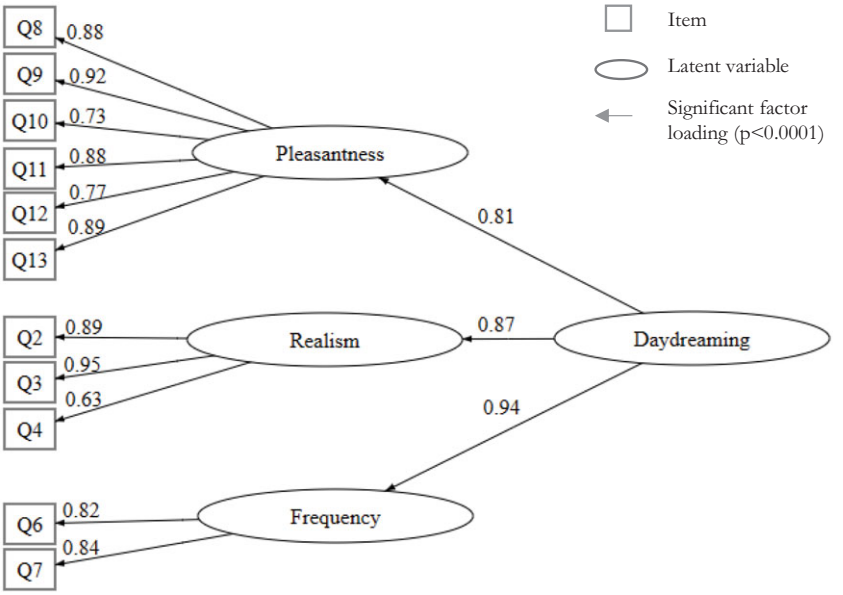

Figure 1. The QuOD final 11-item higher-order factor model after CFA ($n = 2269$).

the estimated differences in factor means were: pleasantness of daydreams latent mean estimate = –0.11, Std. Error = 0.09, $p = 0.21$; realism of daydreams latent mean estimate = 0.15, Std. Error = 0.11, $p = 0.19$; frequency of daydreams latent mean estimate = –0.12, Std. Error = 0.11, $p = 0.30$.

Psychometric properties

Using the CFA sample ($n = 2269$) it was found that the QuOD had good internal consistency (alpha ordinals were: realism of daydreams = 0.86, pleasantness of daydreams = 0.93, frequency of daydreams = 0.81, and higher order factor daydreaming = 0.94). One hundred and nine participants in the clinical group provided repeat data 3–10 days after baseline (mean = 7.29, $SD = 1.37$). Test–retest reliability was good (ICC = 0.75).

Part 2. Item endorsement

Table 2 shows the rates of endorsement of the QuOD items for each of four subgroups: the clinical group with grandiose delusions ($n = 360$), the clinical group without grandiose delusions

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Table 2. Frequencies of endorsement for QuOD items in the clinical groups with and without grandiose delusions, and the non-clinical groups with high versus low grandiosity

			Clinical group with grandiose delusions ($n = 360$)		Clinical group without grandiose delusions ($n = 406$)		Non-clinical group with high-grandiosity ($n = 1374$)		Non-clinical group with low-grandiosity ($n = 2393$)	
			Frequencies of endorsement of items with dichotomised response; *n* (%)							
QuOD subscale		Item content	Not endorsed *n* (%)	Endorsed *n* (%)	Not endorsed *n* (%)	Endorsed *n* (%)	Not endorsed *n* (%)	Endorsed *n* (%)	Not endorsed *n* (%)	Endorsed *n* (%)
Pleasantness	Q8	My daydreams usually provide me with pleasant thoughts	183 (50.8)	177 (49.2)	263 (64.78)	143 (35.22)	701 (51.02)	673 (48.98)	1480 (61.85)	913 (38.15)
	Q9	My daydreams are often stimulating and rewarding	186 (51.7)	174 (48.3)	299 (73.65)	107 (26.35)	731 (53.20)	643 (46.80)	1727 (72.17)	666 (27.83)
	Q10	My daydreams offer me useful clues to tricky situations I face	173 (48.1)	187 (51.9)	309 (76.11)	97 (23.89)	842 (61.28)	532 (38.72)	1885 (78.77)	508 (21.23)
	Q11	My daydreams often leave me with a warm, happy feeling	178 (49.4)	182 (50.6)	303 (74.63)	103 (25.37)	821 (59.75)	553 (40.25)	1748 (73.05)	645 (26.95)
	Q12	I daydream about what I would like to see happen in the future	123 (34.2)	237 (65.8)	232 (57.14)	174 (42.86)	562 (40.90)	812 (59.10)	1353 (56.54)	1040 (43.46)
	Q13	I find my daydreams are worthwhile and interesting to me	130 (36.1)	230 (63.9)	259 (63.79)	147 (36.21)	655 (47.67)	719 (52.33)	1531 (63.98)	862 (36.02)
Realism	Q2	Many of my daydreams have a realistic intensity	151 (41.9)	209 (58.1)	242 (59.61)	164 (40.39)	694 (50.51)	680 (49.49)	1595 (66.65)	798 (33.35)
	Q3	Many of my daydreams are often just as lively as a good movie	162 (45.0)	198 (55.0)	265 (65.27)	141 (34.73)	793 (57.71)	581 (42.29)	1737 (72.59)	656 (27.41)
	Q4	I often confuse my daydreams with real memories	233 (64.7)	127 (35.3)	311 (76.60)	95 (23.40)	1151 (83.77)	223 (16.23)	2192 (91.60)	201 (8.40)
Frequency	Q6	As an adult I (still) occasionally live in a make-believe world	207 (57.5)	153 (42.5)	305 (75.12)	101 (24.88)	949 (69.07)	425 (30.93)	1892 (79.06)	501 (20.94)
	Q7	As an adult I spend a substantial part of my total waking day imagining	196 (54.4)	164 (45.6)	297 (73.15)	109 (26.85)	896 (65.21)	478 (34.79)	1849 (77.27)	544 (22.73)

Items for the QuOD were answered on a 0 to 4 scale with 0 = do not agree and 4 = agree totally. Responses were recoded into a dichotomous scale where items rated 0 and 1 were coded as endorsement level 0, and those rated from 2 to 4 were rated 1.

($n = 406$), the non-clinical group with high grandiosity ($n = 1374$), and the non-clinical group with low grandiosity ($n = 2393$). The mean number of items endorsed for each of the QuOD factors in these subgroups and the non-dichotomised endorsement rates are provided in Tables S5–S7 of the Supplementary material.

In the clinical group with grandiose delusions, 84.7% ($n = 305$) endorsed at least one item on the QuOD. The equivalents rates were 67.0% ($n = 272$) in the clinical group without grandiose delusions, 79.2% ($n = 1088$) in the non-clinical group with high grandiosity, and 66.7% ($n = 1595$) in the non-clinical group with low grandiosity.

The mean factor scores for each of the four groups are shown in Table S8 of the Supplementary material. Kruskal-Wallis one-way ANOVAs indicated that there were significant differences in factor means across the four groups for each of the QuOD factors: pleasantness of daydreams $H(3) = 241.24$, $p<0.0001$; frequency of daydreams $H(3) = 246.87$, $p<0.000$; realism of daydreams $H(3) = 258.33$, $p<0.0001$; and higher order daydreaming $H(3) = 350.86$, $p<0.0001$.

Wilcoxon *post-hoc* pairwise multiple comparison tests found that the clinical group with grandiose delusions had significantly higher (p-adj<0.01) mean factor scores for all daydreaming factors (pleasantness, frequency, realism and higher order daydreaming) than all other groups. The next highest for all factors was the non-clinical high grandiosity group (p–adj<0.01). There were no significant differences between the clinical group without grandiose delusions and the non-clinical low grandiosity group for mean factor scores except for on the pleasantness factor where the clinical group without grandiose delusions had the lowest rates of all subgroups (p–adj <0.001; see Tables S8 and S9 in the Supplementary material).

Part 3. Tests of association

Daydreaming and grandiosity

In the clinical group ($n = 766$) there were significant ($p<0.0001$) moderate-sized correlations between grandiosity and each of the QuOD first-order and higher-order factors (see Table 3). The QuOD factors were themselves strongly associated. When the first-order factors were entered into a structural equation model with grandiosity as the response variable, only 'pleasantness' remained in the model (standardised estimate (Std. Est) = 0.437, $p<0.0001$), explaining 19.1% of the variance in grandiosity (Table 4).

We repeated this analysis in the non-clinical group. Similar but slightly smaller-sized associations were observed in the pairwise correlations (Table 3). In the structural equation model both pleasantness (Std. Est = 0.198, $p<0.0001$) and realism (Std. Est = 0.184, $p<0.0001$) remained in the final model, which explained 12.6% of the variance in grandiosity (Table 4).

To test whether the observed association could be due to conceptual overlap between QuOD items and delusions more broadly, *post-hoc* analyses were conducted. Specifically, items Q4 ('I often confuse my daydreams with real memories') and Q6 ('as an adult I occasionally live in a make-believe world') were removed in turn; however, associations between grandiosity and each of the QuOD first- and higher-order factors remained. A further *post-hoc* analysis found that the association between grandiosity and daydreaming remained the same when controlling for gender.

Daydreaming and time spent thinking about the grandiose belief

In the clinical group with grandiose delusions ($n = 353$). there were significant ($p<0.01$) small-sized correlations between time spent thinking about the grandiose delusion and each of the QuOD first-order and higher-order factors (Table 3). When all three first-order factors were entered into a structural equation model, none of the factor coefficients was significant, indicating that it is the shared variance of daydreaming that predicts the time spent thinking about the grandiose belief, rather than there being a unique effect from any of the three factors (Table 4).

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Table 3. Pairwise correlations of associations between daydreaming, grandiosity, time spent thinking about grandiose beliefs, and grandiose belief conviction

	Pleasantness of daydreams (QuOD factor 1)	Frequency of daydreams (QuOD factor 2)	Realism of daydreams (QuOD factor 3)	Daydreaming (QuOD higher-order factor)
		Full clinical group ($n = 766$)		
Grandiosity (SPEQ-G factor score)	0.42 $p<0.0001$	0.41 $p<0.0001$	0.41 $p<0.0001$	0.49 $p<0.0001$
Pleasantness of daydreams (QuOD factor 1)		0.75 $p<0.0001$	0.79 $p<0.0001$	0.88 $p<0.0001$
Frequency of daydreams (QuOD factor 2)			0.88 $p<0.0001$	0.94 $p<0.0001$
Realism of daydreams (QuOD factor 3)				0.97 $p<0.0001$
		Clinical group with grandiose delusions ($n = 353$)		
Time spent thinking about the grandiose delusion	0.16 $p = 0.002$	0.16 $p = 0.003$	0.20 $p = 0.0002$	0.20 $p = 0.0002$
Grandiose delusion conviction	0.14 $p = 0.010$	0.08 $p = 0.154$	0.11 $p = 0.042$	0.12 $p = 0.029$
		Full non-clinical group ($n = 3767$)		
Grandiosity (SPEQ-G factor score)	0.37 $p<0.0001$	0.37 $p<0.0001$	0.37 $p<0.0001$	0.42 $p<0.0001$
Pleasant (FEQ factor 1)		0.87 $p<0.0001$	0.80 $p<0.0001$	0.94 $p<0.0001$
Frequency (FEQ factor 2)			0.87 $p<0.0001$	0.97 $p<0.0001$
Realism (FEQ factor 3)				0.93 $p<0.0001$
		High grandiosity non-clinical group ($n = 1374$)		
Time spent thinking about the grandiose belief	0.15 $p<0.0001$	0.18 $p<0.0001$	0.17 $p<0.0001$	0.18 $p<0.0001$
Grandiose belief conviction	0.09 $p = 0.0005$	0.05 $p = 0.043$	0.05 $p = 0.046$	0.08 $p = 0.003$

All correlation coefficients are Pearson's *r*, except for those with 'time spent thinking about the grandiose delusion' where Spearman's rho was used, due to the categorical nature of the data.

Table 4. Structural equation models examining the associations between daydreaming and grandiosity, time spent thinking about the grandiose belief, and grandiose belief conviction

SEM regression step	Response variable	Explanatory variable	Estimate	Std. Error	*p*-value	Std. Est
(1) Grandiosity regressed on QuOD factors (full clinical group, n = 766)						
Step 1: all predictors included	Grandiosity	Pleasantness of daydreams	0.369	0.061	<0.0001	0.356
		Frequency of daydreams	0.085	0.109	0.433	0.085
		Realism of daydreams	0.014	0.114	0.905	0.014
Step 2: Realism removed (non-significant)	Grandiosity	Pleasantness of daydreams	0.371	0.057	<0.0001	0.359
		Frequency of daydreams	0.097	0.060	0.102	0.097
Step 3: Frequency removed (non-significant)	Grandiosity	Pleasantness of daydreams	0.454	0.038	<0.0001	0.437
(2) Grandiosity regressed on QuOD factors (non-clinical group, n = 3767)						
Step 1: all predictors included	Grandiosity	Pleasantness of daydreams	0.217	0.030	<0.0001	0.244
		Frequency of daydreams	−0.119	0.050	0.017	−0.120
		Realism of daydreams	0.227	0.036	<0.0001	0.253
Step 2: Frequency removed (suppressor effect)	Grandiosity	Pleasantness of daydreams	0.175	0.025	<0.0001	0.198
		Realism of daydreams	0.164	0.027	<0.0001	0.184
(3) Time spent thinking about grandiose belief regressed on QuOD factors (clinical group with grandiose delusions, n = 353)						
Step 1: all predictors included	Time thinking about grandiose belief	Pleasantness of daydreams	−0.697	0.649	0.283	−0.606
		Frequency of daydreams	−5.288	3.799	0.164	−4.358
		Realism of daydreams	5.731	3.964	0.148	5.004
(4) Time spent thinking about grandiose belief regressed on QuOD factors (high grandiosity non-clinical group, n = 1374)						
Step 1: all predictors included	Time thinking about grandiose belief	Pleasantness of daydreams	−0.124	0.091	0.170	−0.112
		Frequency of daydreams	0.506	0.142	<0.0001	0.405
		Realism of daydreams	0.050	0.096	0.603	0.044
Step 2: Realism removed (non-significant)	Time thinking about grandiose belief	Pleasantness of daydreams	−0.133	0.092	0.150	−0.120
		Frequency of daydreams	0.570	0.111	<0.0001	0.456
Step 3: Pleasantness removed (non-significant)	Time thinking about grandiose belief	Frequency of daydreams	0.376	0.047	<0.0001	0.329
(5) Grandiose delusion conviction regressed on QuOD factors Pleasantness and Realism (clinical group with grandiose delusions, n = 353)						
Step 1: all predictors included	Grandiose delusion conviction	Pleasantness of daydreams	−0.014	0.097	0.885	−0.012
		Realism of daydreams	0.272	0.100	0.007	0.241
Step 2: Pleasantness removed (non-significant)	Grandiose delusion conviction	Realism of daydreams	0.257	0.063	<0.0001	0.228
(6) Grandiose delusion conviction regressed on all QuOD factors (high grandiosity non-clinical group, n = 1374)						
Step 1: all predictors included	Grandiose delusion conviction	Pleasantness of daydreams	0.114	0.064	0.078	0.103
		Frequency of daydreams	0.197	0.099	0.047	0.157
		Realism of daydreams	−0.147	0.064	0.021	−0.129
Step 2: remove Pleasantness (non-significant)	Grandiose delusion conviction	Frequency of daydreams	0.535	0.094	<0.0001	0.416
		Realism of daydreams	−0.331	0.080	<0.0001	−0.290
Step 3: remove Realism (suppressor effect)	Grandiose delusion conviction	Frequency of daydreams	0.179	0.036	<0.0001	0.143

Std. Est, standardised estimate.

When the higher-order factor 'daydreaming' was entered as the only predictor, it explained 7.7% of the variance in time spent thinking about the grandiose delusion (Std. Est = 0.277, $p<0.0001$).

In the non-clinical group with high grandiosity, similar associations were observed in the pairwise correlations (Table 3). In the structural equation model, only frequency of daydreams remained as a predictor in the final model (Std. Est = 0.329, $p<0.0001$), explaining 10.8% of the variance in time spent thinking about the grandiose belief (Table 4).

Daydreaming and grandiose belief conviction

In the clinical group with grandiose delusions ($n = 353$) there were significant ($p<0.05$) small-sized correlations between grandiose delusion conviction and pleasantness, realism and the higher-order daydreaming factor but not with frequency (see Table 3). When pleasantness and realism were entered as explanatory variables into a structural equation model with grandiose delusion conviction as the response variable, only realism remained in the final model (Std. Est = 0.228, $p<0.0001$), explaining 5.2% of the variance in grandiose delusion conviction (Table 4).

In the non-clinical group with high grandiosity, all of the daydreaming factors were significantly associated ($p<0.05$) with grandiose belief conviction; however, the sizes of these associations were very small (Table 3). In the structural equation model, only frequency remained as a predictor of grandiose belief conviction (Std. Est = 0.143, $p<0.0001$) explaining 2.0% of the variance (Table 4).

Discussion

This paper reports the development of the Qualities of Daydreaming Scale (QuoD; the final version is presented in the Supplementary material), a measure designed to allow researchers and clinicians to quickly assess current daydreaming experience with minimal burden for the respondent. We also provide evidence demonstrating an association between daydreaming and grandiosity, and suggest that pleasant, perceptually realistic, and frequent daydreaming may play a role in maintaining grandiose delusions.

Factor analyses during measure development showed that a 3-factor model had a good fit to the data. These factors were pleasantness of daydreams (e.g. '*my daydreams usually provide me with pleasant thought*'; '*I daydream about what I would like to see happen in the future*'), perceptual realism of daydreams (e.g. '*many of my daydreams have a realistic intensity*'; '*I often confuse my daydreams with real memories*'), and frequency of daydreams (e.g. '*as an adult I spend a substantial part of my total waking day imagining*'; '*as an adult I (still) occasionally live in a make-believe world*'). The pattern of correlations supported a higher-order 'daydreaming' factor, indicating that the subscale scores for pleasantness, realism and frequency may be summed together to give a total 'daydreaming' score. Each subscale, as well as the higher-order factor, had good internal consistency and test–retest reliability, and the measure was invariant across non-clinical and clinical groups. As such, the QuOD can reliably measure daydreaming across the spectrum of grandiosity.

We found clear evidence of an association between daydreaming and grandiose delusions in the study participants. Patients with grandiose delusions reported significantly more frequent, perceptually realistic, and pleasant daydreams than patients without grandiose delusions or participants in the non-clinical groups. The non-clinical high grandiosity group had the second highest subscale scores, with patients without grandiose delusions and non-clinical participants with low grandiosity having the lowest scores. Furthermore, daydreaming was moderately associated with grandiosity severity in both clinical and non-clinical groups, and there were significant albeit small associations between daydreaming and time spent thinking about the grandiose belief, and grandiose belief conviction.

What might explain this relationship between daydreaming and grandiose delusions? As outlined in the introduction there are several possibilities, including both a direct route where the

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daydreaming content focuses on the grandiose ideation, and an indirect route where pleasant, frequent and realistic daydreaming, irrespective of the content, contributes to elevated mood, which in turn may drive grandiose ideation. This study did not assess the content of daydreams, but this would be important in future work as it will have implications for therapeutic interventions. It is clear, however, that people with grandiose delusions are spending more time daydreaming and it may be valuable therefore to support patients to find other meaningful activities. This could potentially reduce the frequency of daydreaming, redirecting attention to an alternative source of pleasure and/or meaning.

The study has limitations. The cross-sectional design means that causal relationships cannot be determined, although the development of the QuOD will enable future longitudinal and interventionist studies to be conducted. Another limitation was the recruitment of the non-clinical group via social media (potentially unrepresentative of the non-clinical population) and the representativeness of the participant group (who were predominantly White-British) impacting on the extent to which the findings are generalisable. The QuOD had good psychometric properties; however, it may benefit from further refinement. For example, we only used items adapted from existing measures, and the frequency of daydreams scale in particular may benefit from additional items which would allow for more detailed quantification of the amount of time spent daydreaming. Given the potential importance of daydreaming about grandiose ideation specifically, it would also be helpful to add items which assess the specific content of daydreams as well. Clarification regarding the differences and similarities between constructs of daydreaming, rumination, and repetitive thinking would also be a helpful avenue for future research. A further potential limitation is the possibility for conceptual overlap between items on the QuOD and psychosis more broadly; however, *post-hoc* analyses did not find evidence of this. Finally, in this study we assess just one putative maintenance mechanism for grandiose delusions. The associations between daydreaming and grandiose delusions were in the small-to-moderate range with daydreaming explaining 19.1% of the variance in grandiosity. As such, an intervention targeting only this mechanism would probably not be sufficient. Causation is likely to be multi-factorial, and indeed other studies have identified potential maintenance factors with equivalent or larger associations (e.g. the meaning in grandiose delusions, immersion behaviours, and repetitive thinking about the grandiose delusion explain 53.5, 39.5 and 20.4% of the variance in grandiosity, respectively; Isham *et al*., 2022; Isham *et al*., 2023). Studies have yet to look at the contributions of multiple factors together, which would be valuable for future research.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S1352465824000018

Data availability statement. De-identified participant data will be available in anonymised form from the corresponding author (L.I.) on reasonable request (including study outline), subject to review and contract with the university.

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Competing interests. The authors declare none.

Ethical standards. The study conduct abided by the Ethical Principles of Psychologists and Code of Conduct as set out by the BABCP and BPS. Ethical approval was obtained from the NHS Health Research Authority South Central Oxford C Research Ethics Committee (20/SC/0430) and the University of Oxford Central University Research Ethics Committee (R69315/RE001).

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