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**Character Strengths Afforded by Arts Engagement During Adolescence: The Development and Validation of the Creative Artistic Activities Strengths Affordances Scale (CAASA scale)**

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26 **Abstract**

27 Research into the impact of arts engagement on young people, particularly with regard to  
28 their wellbeing, is seeing ever-growing interest. However, it has been argued that  
29 methodological limitations, particularly a shortage of reliable measurement tools, may be  
30 undermining progress in this research area. Character strengths are established in the  
31 literature as a collection of positive traits - displayed through thoughts, feelings, and  
32 behaviour - that are related to positive development and enhanced mental wellbeing  
33 outcomes. Motivated by the possibility that character strengths that are exercised during arts  
34 activities may, at least in-part, account for the positive wellbeing outcomes that have been  
35 associated with such activities, this paper outlines the development and evaluation of a novel  
36 self-report questionnaire. Specifically, following exploratory and confirmatory factor analysis  
37 on data collected from two separate samples of young people, we present a final 15-item  
38 scale for measuring patterns of character strengths exercised during arts activities. Our scale,  
39 which comprises Self-belief, Social Competence and Curiosity and Exploration, as key  
40 groups of strengths exercised during arts engagement shows reliability, convergent validity,  
41 and evidence of relative independence from trait level measurements. Following our  
42 presentation of its development and validation, the current paper discusses key ways in which  
43 our scale can be beneficial in both research and practice: from helping to clarify the precise  
44 mechanisms by which arts engagement promotes adolescent development and wellbeing, to  
45 supporting arts educators and practitioners that have an interest in leveraging arts engagement  
46 in this way.

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48 **Keywords:** *Character Strengths, Arts engagement, Adolescence, Wellbeing, Development*

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## Introduction

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Creating opportunities to engage in the arts for infants, children and adolescents, is a priority in most societies. Arts programmes specifically for babies are increasingly available, artistic activities are embedded into preschool curricula, and - in addition to subjects like Art, Drama and Music being part of the school curriculum - arts clubs are popular after-school activities. Interestingly, while the promotion of arts engagement in young people may have grown due to implicit assumptions regarding its importance, the potential veracity of such assumptions is seeing ever-greater scientific interest. Today, it is argued, based on research evidence, that early engagement in music, song and dance enhances children's rapidly developing communication and motor skills (Tafari, 2017; Gerry et al., 2012). Similarly, theoretical accounts suggest that in adolescent years, creative activities, intrinsic to many participatory forms of arts engagement, may have an impact on the development of the self as a whole.

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Indeed, in one account, Barbot and Heuser (2017) suggest at least three ways in which creativity may contribute to the development of identity. They suggest that regular engagement in divergent and integrative creative thinking may help the individual explore a wide range of possibilities before finally landing on a "self" or "identity" that is new but adapted to the social world. Similarly, they suggest that the creative outlets adolescents engage in may become a part of their identity, in turn, enhancing their feelings of self-esteem. Last but not least, they argue that the self-expression afforded by creativity can be a source of resilience against the anxieties prevalent in young people.

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Interestingly, in many accounts of adolescent engagement with the arts, even passive, more aesthetic forms of engagement, are argued to have the potential to enhance the self. Indeed, music listening, a popular activity engaged in by most young people, has been linked

76 to empowerment (Elvers, 2016), self-determination (Saarikallio, 2019; Saarikallio et al,  
77 2020), self-esteem (Elvers, 2019), self-awareness (Tarrant et al., 2000; Daykin et al., 2018)  
78 and self-identity formation (North, Hargreaves & Oneil, 2000; Laiho, 2004), as well as  
79 positive social development (Hallam, 2010; Boer & Abubakar, 2014; Schäfer & Eerola,  
80 2020) and mood regulation (Saarikallio & Erkkilä, 2007; Schäfer et al., 2013; Groarke et al.,  
81 2020). In turn, engagement with literature has been associated with enhanced empathy  
82 (Bouley & Godfrey, 2008; Bal & Veltkamp, 2013), and improved social skills more broadly  
83 (Anderson, 2000; Wolf & Baker, 2012).

84         Critically, such accounts of how both aesthetic (more passive) and creative (more  
85 active) forms of arts engagement may benefit young people resonate well with a positive  
86 psychology approach to explaining the outcomes of arts engagement (Nakamura, &  
87 Csikszentmihalyi, 2003). Emerging in 1998, in reaction to what was seen as an over-  
88 emphasis on mental illness and maladaptive behaviour in psychology, positive psychology  
89 focuses on happiness, well-being and positivity (Seligman & Csikszentmihalyi, 2000).  
90 Positive psychology is seeing an increasing presence in the art therapy literature (Wilkinson  
91 & Chilton, 2013), in addition to increasingly being used as a basis for school-based  
92 interventions (Clonan et al., 2004; Shankland & Rosset, 2017). In the current paper,  
93 motivated by the possibility that amongst others, the creativity, self-esteem and social skills  
94 that are exercised during arts activities may, at least in-part, account for positive outcomes  
95 that have been associated with such activities in adolescence, we outline the development and  
96 evaluation of a novel self-report questionnaire for testing this possibility.

### 97 **Arts engagement and wellbeing**

98         The idea that engagement with the arts, both in terms of aesthetic consumption and  
99 creative engagement, can provide benefits for wellbeing is a proposition that is gaining  
100 widespread attention. Such wellbeing advantages are believed to be present over the lifespan

101 (Davies et al., 2015; Tymoszuk et al., 2020). However, they may have particular importance  
102 in adolescence: indeed, it is well documented that adolescence is a pivotal age period for the  
103 onset of mental health conditions, and also increasingly widely acknowledged that,  
104 unmanaged, such conditions may lead to a range of difficulties that continue well into  
105 adulthood (Kessler et al., 2007; De Girolamo et al., 2012; Galvan, 2017). With the increasing  
106 recognition of the need to support mental wellbeing from early adolescence (De Girolamo et  
107 al., 2012; Fisher, 2021), and in age-appropriate ways, the potential usefulness of arts-related  
108 activities, in boosting cognitive, emotional, and social assets, is increasingly considered,  
109 researched and debated.

110 To explore the potential efficacy of the arts in supporting adolescent mental health,  
111 several studies have examined the cognitive, emotional and behavioural outcomes of young  
112 people's engagement with interventions across a range of artistic domains (Anderson, 2000;  
113 Karkou & Glasman, 2004; Bouley & Godfrey, 2008; Hallam, 2010; Hampshire & Matthijsse,  
114 2010; Connolly et al., 2011; Bungay & Vella-Burrows, 2013; Boer & Abubakar, 2014;  
115 Zarobe & Bungay, 2017; Daykin et al., 2018; Ennis & Tonkin, 2018; Geipel et al., 2018;  
116 Rizzi et al., 2020; Mannay et al., 2021). In a review that sought to generally summarise the  
117 effects of creative and artistic activities on different aspects of young people's mental well-  
118 being, Bungay and Vella-Burrows (2013) examined 20 studies involving 11 to 18-year-olds  
119 participating in either performing arts (12 studies), visual arts (4 studies), dance (3 studies),  
120 or music activities (1 study) both at school and within the community. Across these studies,  
121 in activities that were undertaken over a range of time-periods, Bungay and Vella-Burrows  
122 found that improvements in a wide range of outcomes - including confidence, self-esteem,  
123 sense of achievement, empowerment, social skills, and positive behaviour change - were  
124 consistently reported. However, they also rated 16 of the 20 included papers as being at high  
125 risk for bias, and argued that the reliability of any conclusions that the studies drew, was

126 overshadowed by the use of weakly validated measures. In a later paper, Zarobe and Bungay  
127 (2017), reviewed eight studies that involved 11 to 18-year-olds undertaking dance, music,  
128 theatre/ performance, and visual arts activities in the community or as extra-curricular  
129 activities. Increased self-confidence and self-esteem were once more the most frequently  
130 reported benefits of arts activities. However, again, and despite being published four years on  
131 from the review of Bungay and Vella-Burrows (2013), many of the same methodological  
132 issues, including the lack of standardised measurements, were raised.

133         In summary, there is evidence to suggest that art-based activities have the potential to  
134 positively affect young people, with studies documenting improvements in confidence and  
135 self-esteem (Zarobe & Bungay, 2017; Mak & Fancourt, 2019; Rizzi et al., 2020; Mannay et  
136 al., 2021), emotional regulation and expression (Goldstein, 2011; Moneta & Rousseau, 2008;  
137 Rapp-Paglicci et al., 2011), social skills (Karkou & Glasman, 2004; Wolf & Baker, 2012;  
138 Boer & Abubakar, 2014; Ennis & Tonkin, 2018), and creative thinking (Hsiao, 2010; Robson  
139 & Rowe, 2012). However, it is also clear that despite a growing research interest in exploring  
140 the potential benefits of arts engagement on young people's development and wellbeing  
141 (Karkou & Glasman, 2004; Sticklely et al., 2012; Bungay & Vella-Burrows, 2013; Zarobe &  
142 Bungay, 2017; Ennis & Tonkin, 2018), the literature is seeing significant criticism for its lack  
143 of standardised measurement using valid tools (Daykin et al., 2008; Bungay & Vella-  
144 Burrows, 2013; Zarobe & Bungay, 2017). A major problem arising from different studies  
145 using non-standardised measurements is the difficulty of trusting and integrating the  
146 conclusions drawn from such studies. In contrast, the widespread use of theory-driven scales  
147 with dimensions that have internal and convergent validity and test-retest reliability would  
148 encourage the testing of clear hypotheses about how different aspects of arts activities may  
149 offer different benefits to young people.

150 **Character strengths and adolescence**

151           When considering the mechanisms that may underlie the positive impact of arts  
152 engagement on adolescent wellbeing, an interesting possibility is that the arts exert their  
153 influence by allowing individuals to exercise so-called character strengths. Character  
154 strengths, described as comprising crucial aspects of affective, cognitive, and behavioural  
155 tendencies, as well as social and moral abilities, are well established in positive psychology  
156 literature as a collection of positive traits that individuals possess in varying amounts, and  
157 which are related to positive development and enhanced mental wellbeing outcomes  
158 (Petersen & Seligman, 2004; Park, 2004). Critically, following work in which Peterson and  
159 Seligman (2004) proposed the existence of 24 key character strengths in adults, scales  
160 measuring individual differences in these positive traits have been translated to several  
161 languages, and have been shown to be consistent across different cultures (e.g., Ruch et al.,  
162 2010; Feraco et al., 2021).

163           Based on the notion that character strengths mature over the life span, such that a  
164 number of them (e.g., Appreciation of beauty, Leadership, and Self-regulation), may show  
165 less prominence in young people than in adults, The Values in Action Youth (VIA-Youth)  
166 scale (Park & Peterson, 2006b) was developed to measure character strengths in 10 to 17-  
167 year-olds. Here, while an initial assignment of 24 strengths in the VIA-Youth scale to six  
168 underlying “virtue” categories was largely theoretical, factor analysis provided empirical  
169 support for the existence of four factors in adolescent populations, namely Temperance  
170 strengths (e.g., Self-Regulation, Prudence), Intellectual strengths (e.g., Curiosity, Love of  
171 learning), Theological strengths (e.g., Hope, Love), and Other-directed strengths (e.g.,  
172 Kindness, Modesty). Providing support for their validity, the four factors were seen to show  
173 convergent validity with relevant stable personality traits (Park & Peterson, 2006). For  
174 instance, highly associated with the personality trait Openness to experience (Silvia &  
175 Christiansen, 2020) were the strengths grouped under Intellectual strengths, while most



176 associated with Agreeableness were those strengths that grouped under Other-directed and  
177 Theological strengths (e.g., Kindness, Love, Social Intelligence, Teamwork, and  
178 Perspective). In further checks on its reliability and validity, the VIA-Youth scale has been  
179 demonstrated to have moderate internal consistency, six-month test-retest reliability, and to  
180 correlate with teachers' ratings of school children's behaviours and traits (Park & Peterson,  
181 2006b). Indeed, character strengths have been associated with objective outcomes in a range  
182 of academic contexts (Weber & Ruch 2012; Shoshani & Slone 2013; Wagner & Ruch, 2015;  
183 Wagner et al., 2020), with strengths like Love of learning, Perseverance, and Prudence,  
184 showing links to school achievement in 12-year-old Swiss children (Weber & Ruch, 2012).

185         Here, it is relevant to clarify that efforts have been made to clarify the extent to which  
186 character strengths should be viewed as different from personality traits (Dametto & Noronha  
187 2021; McGrath et al., 2017). Indeed, it has been suggested that while character strengths and  
188 personality traits are similar in describing dispositions with regard to values and self-  
189 perceptions, they are different in at least three ways: firstly, unlike personality traits, which  
190 include a very wide spectrum of personal attributes, character strengths are more prescriptive;  
191 for example, including only positive traits (McGrath, 2015). Secondly, and conversely, some  
192 strengths like gratitude, perspective and fairness are argued to not necessarily be reflected in  
193 the main models of personality assessment (McGrath et al., 2017). Thirdly, personality traits  
194 are held to have a biological basis (Bouchard, 1994) and to be relatively stable over time  
195 (Johnsen, 2014), while in contrast it is argued that, because of the greater malleability they  
196 have compared to personality traits, it is possible to train character strengths (Park &  
197 Peterson, 2009). This final difference is perhaps the most important for our research, which  
198 seeks to promote understanding regarding character strengths development through arts  
199 engagement.

200 **The development of character strengths through curated arts activities?**

201 Justification for the study of links between character strengths, arts engagement, and  
202 wellbeing arguably comes from at least three lines of research. The first line of research is  
203 cross-sectional data showing associations between character strengths and the subjective  
204 wellbeing of both young people (Van Eeden et al., 2008; Gillham et al., 2011; Weber et al.,  
205 2013; Ruch et al., 2014) and adults (Park et al., 2004; Shimai et al., 2006; Peterson et al.,  
206 2007). Furthermore, suggesting nuanced underlying mechanisms, links have been made  
207 between specific groups of strengths and specific aspects of wellbeing, with, for instance,  
208 interpersonal or other-directed strengths being particularly related to emotional wellbeing  
209 (Gillham et al., 2011).

210 The second line of research is a preliminary literature linking character strengths  
211 development to arts engagement. One example of such research is a study of the character  
212 strengths exercised during poetry reading in the context of language learning (Piaseka, 2016).  
213 There, participants reported exercising character strengths like creativity and curiosity that  
214 have been related to self-efficacy and life-satisfaction. Other examples of such research -  
215 using qualitative methods - found that young people associate activities such as writing and  
216 dancing with purpose, where purpose is described as “the long-term, forward-looking  
217 intention to accomplish aims that are meaningful to the self and of consequence to the world  
218 beyond the self” (Malin et al., 2017, pp 1200, Malin, 2015).

219 Finally, a third line of research is based on the notion that character strengths can be  
220 trained and developed (Park & Peterson, 2009); in other words that certain activities or  
221 interventions that are designed to train or enhance certain character strengths in individuals  
222 are indeed able to do so. Indeed, a pertinent seminal study by Proyer and colleagues (2013),  
223 that included a writing task, sought to experimentally test the effect of training specific  
224 character strengths on changes in adult life satisfaction. Accordingly, an adult sample,  
225 constituting an “experimental group” was trained in strengths previously identified to be

226 strongly correlated with life satisfaction. Specifically, these participants carried out  
227 interventions relating to Curiosity (participating in new activities that encouraged  
228 exploration), Gratitude (composing a “gratitude letter”) and Humor (completing a Humor  
229 training program by McGhee, 2010), amongst others. Scores on life satisfaction measures  
230 were taken before and after the interventions and compared with those of two control groups:  
231 a waitlist control group and one that was trained in strengths weakly correlated with life  
232 satisfaction. In line with the authors’ hypotheses, the experimental group (trained in character  
233 strengths highly associated with life satisfaction) showed significantly larger increases (pre-  
234 to-post intervention) in life satisfaction levels when compared to both control groups.  
235 Furthermore, the authors reported that those participants that, prior to the intervention,  
236 displayed the lowest levels of the trained strengths, also showed the greatest increases in life  
237 satisfaction following the intervention (Proyer et al., 2013).

238       Taken together then, three lines of findings suggest that carefully designed  
239 interventions, including art-based ones, may be able to contribute to the development of  
240 character strengths that, in turn, promote life satisfaction and other aspects of wellbeing.  
241 Critically, since even outside the character strengths literature, creativity is understood to be  
242 something that can be trained and developed (Scott et al., 2004), arts engagement-based  
243 interventions would appear to afford both the development of creativity specifically, and the  
244 enhancement of character strengths more generally. However, despite these lines of support  
245 for a scale measuring the extent to which creativity and other strengths are being exercised  
246 during the arts, such a scale remains as yet, unavailable.

247       When designing new tools, it is important to be sure that they are truly necessary. We  
248 argue that the tool that we seek to create is valuable for a number of reasons. Firstly, arts  
249 educators and practitioners would benefit greatly from a tool that allows them to robustly  
250 evaluate the impact of their arts-related projects, education programmes, and interventions on

251 young people's character development, and consequently wellbeing. While qualified  
252 researchers could arguably adapt an existing list of character strengths or items in a way that  
253 allows the specific question of character development through art engagement to be  
254 addressed, other groups (e.g., arts educators and practitioners) may not have the confidence  
255 or expertise to do so effectively. Critically, failure to use an appropriate tool in this context  
256 (for example, using, as is, the 96 items present in the VIA youth scale, many of which would  
257 not seem relevant in an arts context) could have detrimental effects on the meaningfulness of  
258 the data acquired.

259         Secondly, our tool is much needed in a research field looking to not only improve the  
260 quality of its insights but which is also looking to better characterise the mechanisms by  
261 which engagement in the arts may afford benefits. Geipel and colleagues (2018) highlighted  
262 how the consistent use of validated scales would allow more accurate estimation of the size  
263 of the effect of arts participation on mental health. Here we emphasise that a validated tool,  
264 that allows careful measurement of the different groups of strengths that may be exercised  
265 during different types of arts engagement, would also allow nuanced insights into  
266 mechanistic links between arts engagement, character strength development and mental  
267 wellbeing. From a methodological perspective, a psychometrically validated scale that allows  
268 researchers to clarify that certain arts activities may afford certain strengths, before they then  
269 test the impact of these activities on mental wellbeing using experimental designs (e.g.,  
270 randomised controlled trials), would be an invaluable addition to the resources available to  
271 researchers.

272         Last but not least, the ability of both researchers and arts practitioners to more  
273 carefully quantify and therefore document the impact of arts engagement on adolescent  
274 development would mean the growth of a much needed-evidence base that can be used to  
275 inform relevant policy-makers' decision-making.

276           Taken together, a reliable tool that can be used to promote insights into how the arts  
277 may be able to promote and enhance adolescent mental wellbeing is much needed. It is  
278 against this backdrop that the current study sought to develop a scale that measures character  
279 strengths exercised during the arts.

### 280 **The current study**

281           Research to date suggests that aspects of character that are developed through  
282 adolescence may go on to promote future wellbeing (Park & Peterson, 2006b; Gillham et al.,  
283 2011). Further, observations that arts interventions are associated with the exercising of  
284 character strengths (Piaseka, 2016; Malin, 2015; Malin, 2017) and may have wide-ranging  
285 positive impact on wellbeing (e.g., Zarobe & Bungay, 2017), provide support for the idea that  
286 the arts can be used to pre-emptively build and develop strengths that will later inhibit certain  
287 mental health issues from emerging.

288           Predicated on the idea that a promising way to examine the mechanisms underlying  
289 the benefits of the arts is by measuring the character strengths young people are exercising  
290 whilst engaging in art activities, the current paper chronicles the development and validation  
291 of a self-report scale -the Creative Artistic Activities Strengths Affordances Scale (CAASA)-  
292 that allows just that. In Study 1, inspired by 24 key character strengths found in the positive  
293 psychology literature, scale items were generated and an initial scale was administered to a  
294 large sample of young adolescents. Subsequently, Exploratory Factor Analysis (EFA) was  
295 conducted to remove irrelevant items and to identify the factor structure in the acquired data.  
296 In Study 2, a second sample of young people filled out the reduced (based on Study 1) set of  
297 items either once or twice. Subsequently, a Confirmatory Factor Analysis (CFA) was used to  
298 confirm the factor structure of the scale, while further evaluation was carried out using tests  
299 of reliability, validity, and independence from trait measures.

300           “The arts” are often described as comprising key domains such as music, visual art,  
301 dance, and literature. However, more sophisticated definitions describe it as a multifaceted  
302 construct encompassing features, including but not limited to novelty, creativity,  
303 representation, enjoyment and individual expression (Dutton, 2006). In this study, we  
304 observed Dutton’s definition of the arts as activities in line with these features. Further,  
305 operating in what is termed the ‘digital age’, we chose to recognize that young people  
306 increasingly show artistry and creativity in the context of digital technologies (Pepler,  
307 2010), and so, rather than exclude them, considered activities such as photograph editing and  
308 digital music production as forms of arts engagement.

309           Continuing along these lines of inclusivity, our study included arts activities engaged  
310 in at home, school (including lessons) and elsewhere and counted relatively passive arts  
311 activities (aesthetic in essence such as music listening and reading), alongside more active  
312 and creative ones (such as playing an instrument or writing) in its definition of arts  
313 engagement. This approach was taken not only because it was deemed optimal to provide a  
314 scale that is relevant for the wide spectrum of ways young people engage with the arts, but  
315 also due to the large amount of literature (as reviewed earlier) confirming the benefits and  
316 importance of even more passive forms of art consumption.

### 317           **Study 1- Item generation and CAASA scale development**

318           The aim of Study 1 was to carry out the first step in the development of a scale that  
319 measures the character strengths young people exercise during engagement in a range of arts  
320 activities.

321           The creation of a new scale involves three stages, namely item development, scale  
322 development, and scale evaluation (Boateng et al., 2018). Here, in Study 1, the item and scale  
323 development stages were undertaken. First, items were generated that pertained to character  
324 strengths-inspired thoughts, feelings, and behaviours that could materialise during artistic



349           In addition to parents or guardians providing informed consent, young people were  
350 also required to agree to participate or not at the beginning of the online questionnaire.  
351 Ethical approval was granted by the University's Ethics committee. A prize draw for £20 gift  
352 vouchers served as an incentive for participation.

### 353 **Materials and procedure**

354           Questionnaire items were inspired by 24-character strengths included in the VIA-  
355 Youth scale (Park & Peterson, 2006b), where character strengths can be described as positive  
356 traits displayed by young people in varying degrees (Park & Peterson, 2006b; Gillham et al.,  
357 2011). In addition to its justification based on the large literature suggesting meaningfulness  
358 of these strengths, basing items for our scale on strengths listed in the well-known VIA-youth  
359 framework, promised greater ease of re-integrating any findings, using our scale, into the  
360 broad and constantly growing literature on character strengths in adolescence.

361           First, three researchers were tasked with generating, for each of the 24 named  
362 strengths, two items that captured how participants might think, feel, or behave when  
363 engaging in any given art activity. Items were worded appropriately for young people and  
364 were framed within familiar social settings (e.g., with friends, at school, or at home). The  
365 items were kept unspecific enough to apply to a diverse range of artistic activities, thus  
366 adhering to our definition of arts engagement as encompassing a range of passive and active  
367 activities.

368           The researchers then established item concurrence by independently evaluating the  
369 quality and relevance of each item generated, before agreeing and settling on a final initial  
370 pool of 24 statements (one item for each strength). Finally, two experts in scale development  
371 and in developmental psychology research assessed the scale items for clarity and age  
372 appropriateness.



373 All final items began with the stem “*In general, when I am doing the art activity that I*  
374 *most frequently engage in...*” and ended with a statement related to the corresponding  
375 strength. For instance, for the strength, “Bravery and Valour”, the item was “*In general, when*  
376 *I am doing the art activity that I most frequently engage in, I tend to try out new things even if*  
377 *I don’t feel very confident*”, for the strength “Perspective” the item was “*In general, when I*  
378 *am doing the art activity that I most frequently engage in, it helps a lot to put myself in other*  
379 *people’s shoes*” while for the strength “Self-regulation”, the item was “*In general, when I am*  
380 *doing the art activity that I most frequently engage in, I feel able to keep my emotions in*  
381 *check*”. A full list of the items can be seen in Table 1. In addition to using the stem [“*In*  
382 *general, when I am doing the art activity that ...*”], our instructions also emphasised the need  
383 for participants to report on their state during the activity. ”Please also note that we are not  
384 asking about how you tend to feel in general or how you tend to see yourself (more questions  
385 about that in the second part of survey!). Rather, we'd like you to think specifically about  
386 what tends to happen and how you tend to feel during the arts activity you just mentioned.”

387 During sessions guided by their school teachers, young people accessed the survey,  
388 which was hosted on an online survey platform (Qualtrics, Provo, UT), through computers in  
389 computer labs. Following inputting of their demographic information at the beginning of the  
390 survey, participants were first provided with a definition of arts activities and were then  
391 required to enter up to five artistic activities they engaged in, indicating the regularity with  
392 which they engaged in each of them.

393 After specifying the art activity that they engaged in the most, as well as where, and  
394 with whom they tended to engage in the given art activity, participants were directed to  
395 consider each of the 24 scale items in terms of their agreement with them. Participants rated  
396 their agreement with each of the items using a 5-point Likert scale ranging from “1- *Not true*  
397 *at all*” to “5- *Very true*”.

**398 Analysis**

399 R Studio version 1.4.1717 was used to conduct data analysis. The data of 4  
400 participants were excluded as they provided the same rating to all items, leaving 381  
401 participants for inclusion in further analysis.

402 To determine the appropriate number of factors to be extracted in a subsequent EFA,  
403 the *nfactors* function from the psych R package (Revelle, 2018) was used to compute a  
404 number of different estimates (e.g., Velicer MAP and Empirical BIC). All items/variables  
405 were then evaluated for skewness, while the Kaiser-Meyer-Olkin (KMO) test, and Bartlett's  
406 test of sphericity were conducted to assess the suitability of the data for structure detection.  
407 Finally, an EFA, specifying *maximum likelihood* as method, was carried out using the  
408 function *fa* from the R package *psych*. Expecting that the extracted factors would be  
409 interrelated, *oblimin* (oblique) factor extraction, which results in variables maximally loading  
410 onto one factor, and which thus increases the interpretability of the analysis (Field et al.,  
411 2012), was employed as the factor rotation method.

412 After the initial EFA, items were removed on three conditions: *i*) if they had  
413 uniqueness values greater than 0.7, since high uniqueness values indicate that a high amount  
414 of the item's variance is not explained by factors in the model (Chen, West & Sousa, 2006)  
415 *ii*) if they had only very low loadings (all < 0.3), or *iii*) if they showed cross loading across  
416 dimensions (i.e. where the ratio of the loading of the strongest group factor to the loading on  
417 the second strongest group factor was 1.5 or less). Different factor solutions were then  
418 estimated and compared based on a number of measures (namely the Bayesian information  
419 criterion (BIC), RMSEA (root-mean-square error of approximation), RMSR (root mean  
420 square of the residuals), TLI (Tucker Lewis index)) before a final solution was accepted.

**421 Results**

422 A large proportion of children reported on painting/drawing (~20%) and general arts  
423 and crafts, and singing (~10% each). Slightly smaller proportions reported on activities  
424 related to drama/theatre, digital creative activities (photo or video editing, coding), music  
425 instrument playing, dance, general music activities, writing, reading and music lessons (on  
426 average ~7% each). Finally, the smallest proportions reported on art lessons and music  
427 listening (each < 3%). A full list can be seen in the appendix.

428 The overall KMO measure of sampling adequacy was revealed to be 0.9 while the  
429 KMO for each of the 24 variables exceeded 0.8. As KMO values between .8 and .9 are  
430 deemed to be 'great' and values above .9 considered 'superb' (Field et al., 2012), the  
431 obtained KMO values confirmed that the data was highly suitable for factor structure  
432 detection. Bartlett's test of sphericity also confirmed sufficient correlations between variables  
433 ( $\chi^2(276) = 2566.46, p < .001$ ), thus providing further evidence that the data were suitable for  
434 factor analysis. No variables displayed skewness or kurtosis (no values > 2 or < -2), and thus  
435 all were included in further analysis.

436 A scree plot shows the first 6 eigenvalues to be 6.66, 1.83 1.64, 1.26, 0.98 and 0.97  
437 (Supplementary Figure 1). Testing for the appropriate number of factors, Sample size  
438 adjusted BIC and Parallel analysis suggested a 4-factor solution would be best, while the  
439 Velicer MAP and Empirical BIC measures recommended a 3-factor solution. BIC indicates  
440 whether higher complexity affords a better model fit over a simpler model. As lower BIC  
441 values signify a better model fit, models with low values should be preferred over those with  
442 higher values (Vrieze, 2012). Thus, as comparison of a 3 and 4-factor model, following EFA,  
443 showed the 3-factor model to have the lower BIC value (3-factor model: -849.82, 4-factor  
444 model: -810.09), an initial EFA with three factors was accepted and, as planned, items were  
445 removed in line with pre-described criteria. Specifically, seven items (corresponding to  
446 Leadership, Love, Perseverance, Prudence, Appreciation of Beauty, Creativity and Gratitude)

447 were removed for yielding high uniqueness values ( $h > 0.7$ ) while a further three items  
448 (corresponding to Teamwork, Forgiveness and Judgment strengths) were removed due to  
449 high cross-loading.

450 Following item rejection, three models (3-factor, 4-factor and 2-factor) were once  
451 more compared to ensure that the 3-factor solution still provided the simplest and best  
452 solution. Once again, the model with three factors yielded a lower BIC value than the 4-factor  
453 model and was also seen to be better than the 2-factor model (3-factor BIC: -186.79; 4-factor  
454 BIC: -166.98; 2-factor BIC: -167.39).

455 Finally, goodness of fit indices were estimated to allow assessment of the fit of the 3-  
456 factor model: the RMSR was 0.04 (values below .05 are recommended; Jackson et al., 2009);  
457 the RMSEA was 0.059, 90% CI [0.046 - 0.073] (values below .060 indicate close fit; Hu &  
458 Bentler, 1999; Field et al., 2012); and the TLI was 0.91 (and was thus acceptable according to  
459 Hu & Bentler, 1999).

460 Figure 1 and Table 1 show how the final remaining 14 items grouped into the three  
461 obtained factors: Factor one, thanks to its items relating to several aspects of self-related  
462 positive thinking and self-regulation, was labelled Self-Belief. Factor two, comprising items  
463 related to positive and constructive interactions with others, was labelled Social Competence.  
464 Finally Factor three, comprising items related to information seeking and positive  
465 experiences with learning, was labelled Curiosity and Exploration (Figure 1).

466 Supplementary Table 1 shows descriptive statistics for scores on this initial scale.  
467 There was no indication of floor or ceiling effects, and all items had very good kurtosis levels  
468 (all values within +1 and -1) and at least acceptable skewness levels (all values within +2 and  
469 -2). Cronbach's alpha measures of reliability for each of the factors indicated moderate/  
470 acceptable internal reliability (Self-belief  $\alpha = 0.75$ ; Social Competence  $\alpha = 0.75$ ; Curiosity &  
471 Exploration  $\alpha = 0.65$ ).

472 **Insert Tables 1 and Figure 1 here.**

473

### 474 **Summary of Study 1**

475 The purpose of Study 1 was to, using EFA, reject ill-fitting scale items and identify  
476 the factor structure within those items that remained. Results recommended the removal of 10  
477 out of 24 items and revealed that a 3-factor solution offered the most stable grouping of the  
478 remaining items. We called the emerging dimensions Self-belief, Social Competency and  
479 Curiosity and Exploration.

480 In line with our predictions, and lending support to their meaningfulness, we note that  
481 the three dimensions are reminiscent of the positive psychology literature on character  
482 strengths in young people (Park & Peterson, 2006b), where four dimensions (labelled  
483 Temperance, Transcendence, Other Directed and Intellectual strengths) tend to be reported.  
484 We note our dimensions are also reminiscent of some of the most widely reported outcomes  
485 of arts engagement in the literature, namely increased self-confidence, and social and  
486 emotional competence.

487 The results of Study 1 were thus compelling in emphasising that strengths exercised  
488 during arts engagement group persuasively into factors related to positive self-view, social  
489 competencies and intellectual strengths. Ultimately, however, the interpretability of factors  
490 and the good model fits obtained in our first study was a necessary basis for continuation to  
491 the next stage of our tool's development.

### 492 **Study 2- Evaluation of the CAASA scale**

493 The purpose of Study 2 was to carry out evaluation of our tool, an important stage in  
494 scale development in which *i*) tests of dimensionality are conducted on data collected from a  
495 new sample of individuals, and *ii*) the confirmed dimensions are then tested for reliability and  
496 validity (Boateng et al., 2018).

497           We administered a new survey comprising items that fell into three distinct parts. The  
498 first part of the survey was the items of our reduced scale comprising statements capturing  
499 character strengths that may be exercised during arts activities. The second part of the survey,  
500 which sought to determine how well our scale's dimensions correlated with items measuring  
501 similar constructs, included items from subscales of three validated measures: the Emotion  
502 Regulation Strategies for Artistic Creative Activities Scale (ERS-ACA; Fancourt et al.,  
503 2019), the Aesthetic Emotions (AESTHEMOS) scale (Schindler et al., 2017), and the  
504 Milwaukee Youth Belongingness Scale (MYBS, Slaten et al., 2019). Finally, the third part of  
505 our survey, which sought to allow evaluation of the extent to which our scale captures state  
506 rather than trait measures, contained both a widely-used test of personality (an adapted  
507 version of the Ten Item Personality Inventory (TIPI) from Gosling et al., 2003, described in  
508 Müllensiefen et al, 2015) and a widely-used test of adolescent social and emotional  
509 adjustment (Strengths and Difficulties Questionnaire (SDQ); He et al., 2013)).

510           With regard to the results of tests of dimensionality of our scale, we expected to find  
511 support (as provided by good model fit indices and evidence of good internal and test-retest  
512 reliability) for the three dimensions we had previously identified using the EFA in Study 1.  
513 Further with regard to determining how well our scale's dimensions correlated with items  
514 measuring similar constructs (convergent validity), we predicted particularly good  
515 convergence between our three scale dimensions and the three subscale dimensions we  
516 selected based on the construct similarities.

517           Firstly, in relation to our Self-belief dimension, which encompasses the strengths  
518 Zest, Self-regulation, Hope, Meaning and Honesty, the Self-development strategies subscale  
519 of the ERS-ACA (Fancourt et al., 2019) was selected. The ERS-ACA measures the different  
520 types of emotion regulation strategies used when engaging in the arts; from 'avoidance' (e.g.,  
521 distraction) and 'approach' (e.g., problem solving) strategies to so-called 'self-development'

522 strategies'. Self-development strategies of the ERS-ACA was considered a similar construct  
523 to Self-belief because it encapsulates items related to a positive self-evaluation and world  
524 view; from enhanced self-identify (e.g., '*...it reaffirms my identity*'), to improved self-  
525 esteem, confidence and agency (e.g., '*...it boosts my self-esteem*', '*...I feel more confident in*  
526 *myself*').

527 Secondly, concerning our Social Competence dimension, which encompasses the  
528 strengths Fairness, Humility, Humour, Kindness, Social intelligence and Perspective, both the  
529 Peer and School subscales of the MYBS (Slaten et al., 2019) were used. The MYBS is a  
530 measure of belonging in youth that seeks to capture the multidimensionality of the construct  
531 (family, school, and peers) and which has better psychometric properties than many previous  
532 similar tools. Belonging is characterised by consistent interpersonal relationships within a  
533 group, and so we expected our Social Competence dimension, comprised of interpersonal  
534 strengths, to show high correlation with feelings of belonging to school and peers (e.g., Peer  
535 Belongingness '*...get along with peers*' and School Belongingness '*...enjoy going to*  
536 *school*').

537 Lastly, we compared our Curiosity and Exploration dimension with the Epistemic  
538 Emotion items of the AESTHEMOS scale (Schindler et al., 2017). The AESTHEMOS scale,  
539 which is a tool designed to assess the aesthetic emotional responses to stimuli from a range of  
540 domains (e.g., design, architecture, nature), comprises seven factors: negative, prototypical  
541 aesthetic, animation, nostalgia/relaxation, sadness, amusement and epistemic emotions. We  
542 used the Epistemic Emotion items of the AESTHEMOS scale since these relate to  
543 knowledge-based responses to the arts such as Curiosity (e.g., '*made me curious*'), Interest  
544 (e.g., '*sparked my interest*'), and Insight (e.g., '*felt a sudden insight*').

545 In general, we expected that the three dimensions of our scale would be at least  
546 moderately to strongly correlated with the scales that we selected ( $r$  values from .5 upwards)

547 in line with conventions for assessing convergent validity. However, given the inter-  
548 relatedness of our scale's dimensions, and the inter-related nature of the constructs we used  
549 for validity checking, we also anticipated small to moderate correlations between *i*) all of the  
550 dimensions of our scale and *ii*) pairs of the set of constructs (*r* values up to approximately .6)

551 Finally, with regard to determining the extent to which art-activity related states rather  
552 than merely trait character strengths were indeed being measured by our scale, we expected  
553 that while we would see largest associations between each of our three dimensions and those  
554 stable traits that the literature has suggested are most associated with the character strengths  
555 in each of these three dimensions (e.g. our Curiosity and Exploration dimension correlating  
556 most strongly with Openness to Experience of the Big 5 TIPI scale, and our Social  
557 Competence dimension with both the Agreeableness of the Big 5 TIPI scale, and the pro-  
558 social scale of the SDQ), we would also see that such correlations were nevertheless only  
559 small to moderate sized (rather than strong) and that such associations were not exclusive (i.e.  
560 such predictable state-trait associations were accompanied by comparable sized correlations  
561 between less expected pairs of state-trait constructs).

562

563

## Methods

### 564 Participants

565 As for Study 1, we aimed to recruit 450 participants since we anticipated a number of  
566 both incomplete responses and responses where young people erroneously responded based  
567 on a non-creative non-art activity. Data screening procedures matching those in Study 1  
568 resulted in 301 data cases for analysis ( $M = 12.67$ ,  $SD = 0.89$ ; Females = 142 participants,  
569 Males = 138 participants, Non-binary / Prefer not to say = 21 participants).

570 Of these participants, approximately 70 were invited to complete the scale at a second  
571 time point, so as to allow assessment of test-retest reliability of our scale. These participants  
572 were the only ones invited to participate as they belonged to the only classes that were able to



573 participate again before the school year ended. On completing the scale a second time, they  
574 were required to think back to the activity they had reported the first time they completed it,  
575 and to once more provide responses based on that activity. To increase the likelihood that we  
576 would obtain a correct identifying code (necessary for matching participants' responses  
577 across their two completions of the survey), participants were required to provide their unique  
578 identifying code both at the beginning and at the end of the second survey.

579 We opted for a semi-conservative approach whereby i) as long as it was clear that  
580 entries were from the same participant (e.g., juab11 and abju11, with no other codes  
581 containing ju or ab), and ii) as long as the activities reported were similar across timepoints  
582 (e.g., 1<sup>st</sup> entry: *drawing* and 2<sup>nd</sup> entry: *art*), participant data was included in the analysis. This  
583 led to a final sample of 55 participants being used in the test-retest reliability analysis. In  
584 addition to requesting informed consent from parents and guardians, young people were also  
585 required to provide consent before commencing all surveys. Ethical approval was granted by  
586 the University's ethics committee.

### 587 **Materials and procedure**

588 Supplementary Table 2 shows the items used in Study 1 and Study 2. In the interest of  
589 increasing the stability of the final scale, it was decided to add a new item to the 14 items that  
590 were retained following Study 1. This new Creativity-related item "*When I am engaging...I  
591 tend to think of new and different ways of doing things*" was expected to load onto the  
592 Curiosity and Exploration dimension and, in potentially bringing the number of items in this  
593 dimension from three to four, was expected to provide an item-to-factor loading more  
594 comparable to the two other dimensions (having five and six items).

595 Participants completed all scales in the same order. First, they rated their agreement  
596 with the 15 items regarding character strengths exercised during their named art activity.  
597 Next, participants responded to the 17 items that were chosen to assess convergent validity of

598 the three dimensions of our scale namely: the five items of the Self-development Strategies  
599 subscale of the ERS-ACA (Fancourt et al., 2019); the three Peer and three School  
600 Belongingness subscale items from the MYBS (Slaten et al., 2019); and finally, the six  
601 Epistemic Emotions subscale items from the AESTHEMOS (Schindler et al., 2017). All  
602 items were presented to begin with “*In general, when I am doing the art activity I mentioned*  
603 *above, I feel ...*” to ensure that state experiences were reported.

604         Following this, participants responded to scale items that were included to examine  
605 levels of independence of what our scale sought to measure (namely states) from stable  
606 personality traits, and levels of social and emotional adjustment; specifically, an amended  
607 version of the TIPI (Gosling et al., 2003), which, to improve accessibility for adolescents  
608 includes 2 additional synonyms for each of the 10 items (see Müllensiefen et al., 2015) and  
609 the Pro-social Behaviour, Emotional Symptoms, Hyperactivity and Peer problems subscales  
610 of the Strengths and Difficulties Questionnaire (SDQ; He et al., 2013).

611         The survey closed with a thank you note and a debrief page. As in Study 1, a prize  
612 draw with the opportunity for participants to win £20 gift vouchers was used to incentivise  
613 participation.

#### 614 **Analysis.**

615         Data analysis was conducted using R Studio version 1.4.1717. The *cfa* function from  
616 the *lavaan* package was used to carry out a CFA on the new data. To determine the fit of the  
617 model to the data and following best practice in CFA goodness of fit evaluation (Brown,  
618 2006), we estimated Standardised Root Mean Square of the Residuals (SRMR), Root Mean  
619 Square of the Error Approximation (RMSEA), Akaike Information criterion (AIC),  
620 Comparative fit index (CFI) and Tucker Lewis index (TLI), thus covering all types of model  
621 fit evaluation (absolute, parsimony, comparative).

622 Pearson's correlation analyses were then carried out in order to explore the  
623 associations between the three dimensions of our scale and all other scales presented. To  
624 determine internal reliability of the scale, we computed Cronbach's alpha values, while to  
625 evaluate test-retest reliability, we submitted participants' test scores, at baseline and after a  
626 follow up of at least three weeks, to the *test-retest* function from the *psych* package.

## 627 **Results**

628 Study 2 analyses aimed to confirm and validate the 3-factor structure identified in  
629 Study 1, to determine the quality of internal and test-retest reliability of our scale, and finally,  
630 to use correlational analysis to establish both convergent validity of our scale on the one  
631 hand, and its relative independence from trait measurement, on the other.

### 632 **CFA**

633 We computed a CFA specifying three factors, where the 14 items from Study 1 were  
634 assigned to dimensions in line with the results of the EFA, and where the new Creativity-  
635 related item was additionally assigned to the Curiosity and Exploration dimension. Fit indices  
636 indicated a satisfactory fit of the model to the data ( $\chi^2 = 202.6$ ,  $df = 87$ ,  $p < .001$ ; RMSEA =  
637 0.069, SRMR = 0.053, TLI = 0.90, CFI = 0.92, AIC = 12220.04). Table 2 shows the 15  
638 items, and their membership and loading, on to the three factors.

639

640 **Insert Table 2 about here.**

### 641 **Measures of reliability**

642 Reliability estimates indicate the consistency of measurement of a self-report  
643 Questionnaire, both across participants and over time (Wieland et al., 2017). Cronbach's  
644 alpha measures of reliability provided the following values: Self-belief  $\alpha = 0.76$ ; Social  
645 Competence  $\alpha = 0.81$ ; Curiosity & Exploration  $\alpha = 0.78$ . Further, a test-retest correlation of  
646 0.72 was obtained for the Self-belief subscale, 0.75 for the Social Competence subscale and

647 0.69 for the Curiosity & Exploration subscale. Thus, taken together, results confirmed the  
648 scale to have largely acceptable reliability properties.

#### 649 **Construct validity**

650 Table 3 shows the results of Pearson correlations between the three dimensions of our  
651 scale and subscales taken from the ERS-ACA (Fancourt et al., 2019), AESTHEMOS  
652 (Schindler et al., 2017), and MYBS (Slaten et al., 2019) scales. As predicted, all three factors  
653 of our scale demonstrated convergent validity (at least moderate correlation,  $r > .5$ ) with the  
654 specific closely related subscales from other measures: specifically our Self-Belief dimension  
655 with the Self-Development Strategies subscale of the ERS-ACA ( $r = 0.72$ ); our Social  
656 Competence dimension with both Peer Belongingness ( $r = 0.63$ ) and School Belongingness ( $r$   
657  $= 0.58$ ) subscale of the MYBS, and our Curiosity and Exploration dimension with the  
658 Epistemic Emotions ( $r = 0.65$ ) subscale of the AESTHEMOS. Critically, these anticipated  
659 correlations were also the highest observed between our subscales and those selected for  
660 comparison.

661 Nevertheless, also in line with our acknowledgment of the inter-relatedness of our  
662 constructs as well as the inter-relatedness of those scales which we used to establish  
663 convergence validity, notable is *i*) that the three factors in our scale also correlated  
664 significantly with each other (all  $r$  between 0.5 and 0.56) and that *ii*) the scales we used for  
665 evaluating convergent validity also correlated fairly highly with each other (all  $r$  between  
666 0.54 and 0.76).

667 **Insert Table 3 about here.**

#### 668 **Scale's independence from trait measures?**

669 Table 4 shows the results of Pearson correlations between the three dimensions of our  
670 scale and subscales of the TIPI (Gosling et al., 2003; Müllensiefen et al., 2015), while Table  
671 5 displays the correlations between our scale's dimensions and the SDQ (He et al., 2013).

672           With regard to correlations between our scale's dimensions and subscales of the TIPI,  
673 we observed a range of associations from non-significant to both small positive ( $r$  values  
674 ranging from 0.03 to 0.44) and small negative ( $r$  values ranging from -0.24 to -0.45)  
675 associations. Specifically, all three dimensions of our CAASA scale displayed *i*) small  
676 positive associations with Agreeableness, Conscientiousness and Openness ( $r$  values ranging  
677 from 0.24 to 0.44), *ii*) small negative associations with Neuroticism ( $r$  values ranging from -  
678 0.24 to -0.45), and *iii*) negligible associations with Extroversion ( $r$  values ranging from 0.03  
679 to 0.22).

680           As we expected, Self-belief showed a small negative association with Neuroticism ( $r$   
681 = -0.45). However, also expected, and speaking against the idea that Self-belief may simply  
682 therefore reflect trait emotional stability/ Neuroticism, positive correlations of Self-belief  
683 with Agreeableness, Conscientious and Openness were seen to be comparably high ( $r$  values  
684 up to 0.44). Similarly, while the Social Competence dimension's highest correlation was with  
685 Agreeableness ( $r = 0.43$ ), we found this dimension to have comparably high correlation  
686 strengths with Conscientiousness ( $r = 0.38$ ) and Openness ( $r = 0.35$ ). Last but not least,  
687 Curiosity and Exploration correlated highest with Openness to Experience but as with all our  
688 other dimensions only at to a limited degree( $r = 0.43$ ).

689           With regard to comparisons with the SDQ, all three subscales showed small to  
690 moderate associations with the Pro-social scale ( $r$  values between 0.39 and 0.54) but just non-  
691 significant to negligible or small associations with Peer Problems ( $r$  values between -0.29 and  
692 -0.04), Emotion Problems ( $r$  values from -0.34 to 0.07) and Hyperactivity ( $r$  values ranging  
693 from -0.32 to -0.17). Critically, while Social Competence showed the highest correlation with  
694 Pro-social as may be expected ( $r = 0.54$ ) and while Self-belief was the only dimension to  
695 show a significant relationship with Emotional Problems ( $r = -0.34$ ), the relatively weaker  
696 correlations seen ( $r$  values up to  $\pm 0.54$ ) compared to when testing for convergent validity ( $r$

697 values up to 0.72) suggest that our scale may generally measure character strengths exercised  
698 during arts activities rather than simply stable traits related to personality and strengths and  
699 difficulties in everyday life.

700 **Insert Tables 4 and 5 about here.**

701 Supplementary Table 3 shows descriptive statistics for scores on our final scale. There  
702 was no indication of floor or ceiling effects and apart from the Fairness item (which had only  
703 acceptable kurtosis (-1.12)), all items showed very good kurtosis and skewness (all values  
704 within +1 and -1). The final scale, with a description, and dimension details can be seen in  
705 Supplementary Table 4.

706

## 707 **Summary of Study 2**

708 Study 2 sought to establish support for the 3-dimension structure identified in Study 1  
709 and to examine evidence of scale reliability, scale validity, and relative independence of our  
710 scale from more stable trait measures.

711 We were able to confirm the model structure from Study 1, and our results showed  
712 satisfactory internal reliability and test-retest estimates. Indeed, although it has been  
713 suggested that a reliability of .95 should be considered the desirable standard, our obtained  
714 scores ranging between 0.76 and 0.81, exceed the .70 cut-off that is commonly used (Lance et  
715 al., 2006; Nunnally, 1970)

716 Further, the observed relationships between our scale's three dimension and the  
717 subscales from the AESTHEMOS (Schindler et al., 2017), ERS-ACA (Fancourt et al., 2019),  
718 and MYBS (Slaten et al., 2019) corroborated the convergent validity of our scale's  
719 dimensions. Finally, the absence of high and exclusive correlations between our scale's  
720 dimensions and the most relevant TIPI (Gosling et al., 2003; Müllensiefen et al., 2015) and  
721 SDQ (He et al., 2013) dimensions provided support for the idea that when young people are

722 responding about artistic activities using our scale, they are likely reporting on the thoughts,  
723 feelings and behaviours related to the art activity itself, rather than merely on the personality  
724 traits or general strengths and difficulties that they experience in daily life.

## 725 **Discussion**

726 The current work outlines the development and evaluation of the CAASA scale, a  
727 novel self-reporting instrument able to measure the character strengths young people derive  
728 from engagement in artistic and creative activities. After reviewing literature examining the  
729 impact of arts engagement on young people, alongside the literature examining the presence,  
730 and development of character strengths in adolescence, we argued for the need to be able to *i)*  
731 use validated methodological approaches in arts engagement research and *ii)* measure the  
732 character strengths that are being exercised during arts engagement, if we are to better  
733 understand how arts engagement can promote wellbeing. Ultimately, we proposed that a  
734 validated scale that allows young people to report on the strengths they are exercising when  
735 engaging in the arts would allow a more nuanced understanding of the specific aspects of arts  
736 engagement that may influence specific forms of wellbeing.

737 Following administration of an initial 24-item version of our scale to an initial sample  
738 of young people, a reduced 14-item scale with a three-factor structure was obtained through  
739 EFA. The factor structure of our final scale (the reduced 14-item scale with one item added)  
740 was then confirmed in a CFA on data from a new sample of participants. Analysis of this data  
741 confirmed convergent validity and internal reliability of the scale, while analysis of data from  
742 participants who completed the scale again after a roughly three-week period allowed us to  
743 establish our test-retest validity. Finally, we managed to confirm relatively good  
744 independence of our scale from trait level scales that measure stable personality traits and  
745 trait level strengths and difficulties (rather than state experiences).

746 Many emotional, cognitive and behavioural processes, in relation to the self and  
747 others, are held to mature and develop around adolescence (Bono et al., 2019; Nelson et al.,  
748 2019). This period in life thus arguably presents as an ideal one in which to promote such  
749 processes even further through the use of carefully designed interventions. The main aim of  
750 the current work was therefore to provide a research tool that would allow mechanisms  
751 underlying the positive developmental effects of carefully designed arts interventions to be  
752 more thoroughly studied. Interestingly, the factor structure identified in our scale suggests  
753 that engagement in artistic activities in adolescence may be a constructive way to foster  
754 character development in three key ways. Specifically, both our exploratory factor analysis  
755 and confirmatory factor analysis presented what we called Self-belief, Social Competence  
756 and Curiosity and Exploration to be key dimensions of character strengths that show  
757 meaningful variations and covariations during engagement in the arts.

#### 758 **Self-belief as a key affordance of arts engagement**

759 As expected, our Self-belief dimension showed highest correlation values with the  
760 Self-development subscale of the ERS-ACA, where the ERS-ACA is a scale used to measure  
761 the emotional regulation strategies employed when engaging in the arts (Fancourt et al.,  
762 2019). We expected this relationship because our scale's Self-belief dimension comprises  
763 items capturing experiences of Emotion regulation, Hope, Zest and Meaning amongst others  
764 while the ERS-ACA Self-development subscale includes items related to positive self-  
765 evaluation and world view from enhanced self-identify and improved self-esteem to  
766 increased agency (e.g., '*...I feel more confident in myself*'). Critically, the prominence of the  
767 Self-belief dimension is in line with the wide-ranging literature suggesting that the arts can be  
768 used to promote self-esteem and confidence in young people (e.g., Zarobe & Bungay, 2017;  
769 Mak & Fancourt, 2019; Rizzi et al., 2020; Mannay et al., 2021)-



770 Described as an individual's set of thoughts and feelings about their worth and  
771 importance (Rosenberg, 1965), self-esteem is commonly associated with positive mental  
772 health more broadly (Newbegin & Owens, 1996; Boden et al., 2008; Henriksen, Ranøyen,  
773 Indredavik, & Stenseng, 2017). Thus, with the onset of puberty being associated with a large  
774 drop in self-esteem (e.g., Robins et al., 2002), it seems highly relevant to ask whether art  
775 activities are a useful intervention particularly at this stage of life. It has been argued that the  
776 creative outlets adolescents engage in become a part of their identity, in turn enhancing  
777 feelings of self-esteem (Barbot & Heuser, 2017). Against this backdrop, we argue that the  
778 subscale we describe as Self-belief (in comprising positive evaluative and affective  
779 considerations of the self-concept) may be useful in capturing such positive changes in self-  
780 evaluation in periods following arts engagement.

781 Relatedly, an important question our scale can help address is what aspects of an art  
782 activity may make it confer positive feelings towards one's self. Evidence that an activity like  
783 music listening drives empowerment, agency, self-determination and self-esteem (Elvers,  
784 2016; Elvers, 2019; Saarikallio, 2019; Saarikallio et al, 2020) begs the question that creative  
785 engagement is a decisive ingredient for positive feelings towards the self. Barbot (2020),  
786 previously noted that understanding how creativity is related to self-esteem would help  
787 optimise the design of creativity-based interventions that seek to improve self-esteem. Here  
788 we similarly argue that knowing what aspects of an arts activity make it confer positive  
789 feelings towards one's self (our self-belief dimension) would help optimise arts-based  
790 interventions that seek to improve young people's mental health.

791

792 **Curiosity and Exploration and Social Competence as further affordances of arts**  
793 **engagement.**

794 Our findings that the feelings and behaviours related to Curiosity and Exploration  
795 reflect a key group of strengths afforded by art engagement is interesting given findings *i*) of  
796 a bidirectional relationship between Openness to Experience and arts engagement (Schwaba  
797 et al., 2018) and *ii*) that asking questions, a primary expression of curiosity, tends to decrease  
798 with years of formal schooling (Vidler, 1977; Engelhard & Monsaas, 1988). Creative and  
799 artistic activities have been argued to allow young people to explore the outcome of different  
800 processes while placing less focus on the quality of the output (Karkou & Glasman, 2004). It  
801 is also thought to be important both in the formation of creative identity and in the formation  
802 of identity in general. Indeed, Barbot and Heuser (2017) suggest that practice with both  
803 divergent and convergent forms of creative thinking helps the individual explore possibilities  
804 regarding how to mould their unique identity. However, the extent to which experiences of  
805 creativity and learning during arts engagement, in particular, may be positively reinforcing  
806 and have positive outcomes in adolescents requires deeper examination. Our scale affords  
807 opportunities in this regard.

808 Our scale also offers the opportunity for researchers and practitioners to identify  
809 which arts activities or interventions may be particularly high in inducing curiosity and  
810 exploratory behaviours in young people; this, at a time when the schooling system seems to  
811 discourage curiosity-related behaviours (Vidler, 1977; Engelhard & Monsaas, 1988).  
812 Relatedly, the curiosity and exploration subscale may also be useful in helping to provide  
813 insights into the relationship between intellectual strengths and self-esteem– the nature of  
814 which is still under debate. For example, while a number of studies have suggested that self-  
815 esteem tends to be high in creative people (Deng & Zhang, 2011), at least some evidence of  
816 negative relationships between general creativity and self-esteem are also present in the  
817 literature (e.g., Lau, Li, & Chu, 2004). In our scale, the self-belief dimension was distinct  
818 from the curiosity and exploration dimension to which the creativity related item was

819 clustered. An interesting question, therefore, is under what conditions these dimensions  
820 nevertheless co-vary.

821         Finally, with regard to the dimension of the CAASA that we named Social  
822 Competence, it is once more interesting to consider the resonance observable with previous  
823 literature: specifically, the growing number of studies showing that arts engagement may help  
824 young people to develop social skills (Karkou & Glasman, 2004; Wolf & Baker, 2012; Boer  
825 & Abubakar, 2014; Ennis & Tonkin, 2018). Our Social Competence dimension includes  
826 items that describes feelings and behaviours related to building interpersonal relations: from  
827 trying to see things from others' perspectives to treating others well with the aim of getting  
828 on better with them. It is likely that opportunities to engage with, and show consideration of  
829 others, along with the reciprocation that adolescents may receive, may account for the  
830 increases in the social skills and wellbeing described by many authors as key benefits of arts  
831 engagement (Harkins et al., 2016). Critically, our scale's ability to measure the extent to  
832 which such behaviours are being exercised, precisely as arts activities are being engaged in,  
833 could be powerful when seeking to examine longer-term wellbeing outcomes related to social  
834 interactions.

### 835 **Arts engagement and self-beliefs**

836         At this point, it is worth noting how character strengths development through the arts  
837 may be influenced by young people's beliefs about their ability to achieve their goals in  
838 general (termed self-beliefs, Bandura, 1995), and in a creative realm, (termed Creative self-  
839 beliefs, Beghetto & Karwowski, 2017). Creative self-efficacy -a person's confidence that  
840 they can be creative in a task under a given context - is held to be a key factor influencing  
841 levels of engagement with the arts (Karwoski & Barbot, 2016). As such, creative self-efficacy  
842 can be seen as a bottle neck for character strength development through the arts. In other  
843 words, in the absence of explicit pressure from parents and teachers to engage in the arts,

844 high creative self-efficacy in adolescents may be necessary for arts engagement to occur and,  
845 in turn, in order for character strengths to develop through said art engagement.

846 Finally, an important question that our scale can help to address is the extent to which  
847 positive general self-beliefs (e.g., high self-efficacy and high self-esteem) may emerge from  
848 creative self-beliefs (e.g., creative self-efficacy and creative self-esteem; Barbot, 2020).

849 Indeed, as an underlying assumption of our research is that the character strengths exercised  
850 during arts engagement are relevant in the context of non-art activities; this question presents  
851 itself as a highly relevant one that the scale should be used to address.

### 852 **Independence from trait measurements?**

853 In addition to aiming to establish our scale's validity and reliability, we also sought to  
854 evaluate the degree of independence of our scale (as a measure of state experiences related to  
855 arts engagement) from trait level characteristics related to personality and strengths and  
856 difficulties in everyday life. Here, even though we expected to see the highest correlations  
857 emerging between our scale's dimensions and the most relevant trait level construct (since  
858 those individuals who possess higher levels of a trait would be more likely to express it in  
859 everyday contexts), we predicted that our scale dimensions would fail to show the kinds of  
860 strong and exclusive associations with other trait dimensions that would suggest our scale  
861 was merely measuring stable traits.

862 In line with these predictions, we were able to confirm that any correlations between  
863 personality traits and the three specific dimensions of our scale were largely non-exclusive.  
864 Specifically, while Self-belief showed its highest correlation with Neuroticism, Social  
865 Competence with Agreeableness, and Curiosity and Exploration with Openness to  
866 Experience, many comparably-sized less intuitive relationships were also seen (e.g., Self-  
867 belief with Conscientiousness and Agreeableness). A similar pattern was observable with  
868 regard to associations between our scale's dimensions and subscales of the SDQ. Thus, taken

869 together, while the patterns of relationships between our new scale and trait level factors were  
870 seen to be highest where they might be expected (given that trait level characteristics may be  
871 expected to influence propensities for feelings and behaviours in everyday life), there was  
872 sufficient evidence that our scale does not merely measure trait level individual differences.

### 873 **Limitations and future outlook**

874         Alongside the strengths of the current work lie a number of limitations that are  
875 important to consider. One issue lies in our not collecting information on participants'  
876 parental socio-economic status (pSES). Previous research shows there is a strong association  
877 between pSES and Openness to Experience (Ayoub et al., 2018). Without being able to test  
878 for this relationship within our data, the observed correlations between the CAASA and TIPI  
879 scores should be taken with caution, and we recommend future research acquire pSES data to  
880 investigate any impact of pSES on CAASA scores. Relatedly, we did not collect information  
881 on the level of expertise the young people had in the activities they reported on.  
882 Consequently, we are unable to comment on how or whether this variable may influence the  
883 exercising of character strengths during arts engagement. While it may be expected that  
884 expertise levels spanned the whole possible range, it would be useful to know whether  
885 character strengths development from the arts varies as a function of previous experience and  
886 expertise levels.

887         A further important thing to note is that while it will be beneficial to be able to use our  
888 scale to evaluate both passive, aesthetic and active, creative types of arts engagement,  
889 inclusion of both types of activities during scale development, with the range of experiences  
890 they entail, may have compromised CAASA's psychometric properties. Relatedly, we  
891 suggest that some aspects of our validation process could be improved on in future work. For  
892 instance, while lower strength associations may be taken to reflect divergent validity to some  
893 degree, our failure to try to more directly establish divergent validity presents as a limitation

894 of our studies. Finally, re-evaluating the test-retest reliability of our scale with a larger sample  
895 than we managed here is recommended in future work.

896 In any case, we suggest our final Creative Artistic Activities Strengths Affordances  
897 scale (CAASA) has wide-ranging potential for future use in research contexts. Firstly, the  
898 scale offers itself up as invaluable in research designs seeking to show the particular aspects  
899 of arts engagement (e.g., the opportunity to be creative, to derive reward from novelty, to  
900 work non-competitively alongside others), that may lead to reported benefits on different  
901 aspects of adolescent wellbeing (e.g., emotional wellbeing often related to interpersonal  
902 strengths). Such nuanced links between arts affordances and specific aspects of wellbeing,  
903 while important, still need careful exploration.

904 Secondly, our scale promises advantages in use in intervention designs. Specifically,  
905 just as for the intervention study from Proyer and colleagues (2013) -whereby participants  
906 underwent training in strengths that are strongly or weakly tied, to a wellbeing outcome- our  
907 scale could be used to pre-select appropriate main and comparison arts-related interventions,  
908 that would in turn allow powerful experimental and randomised controlled designs (more  
909 powerful than cross-sectional designs) to be used in future research. In such studies, young  
910 people could be tasked with reporting on experiences of artistic and creative activity that they  
911 engage in at regular intervals; this in order to see how any changes in the different  
912 dimensions of the CAASA may be associated with concomitant changes in specific wellbeing  
913 measures.

914 Thirdly, our scale promises great impact outside research contexts, where such a tool  
915 is much needed. Indeed, arts educators and practitioners would benefit greatly from being  
916 able to robustly evaluate the role of their arts-related programmes in adolescent development  
917 and wellbeing, and, in doing so, to grow both their, and decision-makers', confidence in art  
918 engagement's putative benefits in this regard.

919           Finally, developing the CAASA for use with younger children, older adolescents and  
920 young and older adults would allow for the same kinds of research to be undertaken across  
921 different stages of development. Understanding the ways in which arts engagement may  
922 promote the development of character strengths is highly relevant across the lifespan, given  
923 the need for effective (wellbeing) interventions at all stages of life.

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**Figure Captions**

**Figure 1**

Item Loadings and Inter-factor Correlations following EFA.

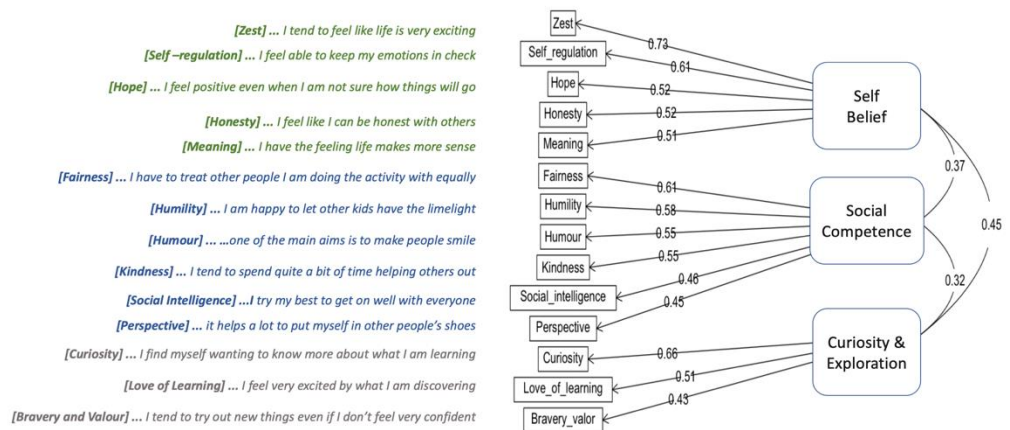


Table 1

*Questionnaire items and loadings of CAASA after Study 1*

Item	Self- Belief	Factor loadings		
		Social Competence	Curiosity & Exploration	Uniqueness
<b>Zest</b> - I tend to feel like life is very exciting	0.726			0.484
<b>Self-Regulation</b> -I feel able to keep my emotions in check	0.608			0.637
<b>Hope</b> - I feel positive even when I am not sure how things will go	0.524			0.61
<b>Honesty</b> - I feel like I can be honest with others	0.517			0.654
<b>Meaning</b> - I have the feeling life makes more sense	0.507			0.586
<b>Fairness</b> - I have to treat other people I am doing the activity with equally		0.612		0.643
<b>Humility</b> - I am happy to let other kids have the limelight		0.585		0.684
<b>Humour</b> - one of the main aims is to make people smile		0.549		0.557
<b>Kindness</b> -I tend to spend quite a bit of time helping others out		0.548		0.581
<b>Social intelligence</b> - I try my best to get on well with everyone		0.458		0.56
<b>Perspective</b> - it helps a lot to put myself in other people's shoes		0.448		0.663
<b>Curiosity</b> - I find myself wanting to know more about what I am learning			0.657	0.548
<b>Love of learning</b> - I feel very excited by what I am discovering			0.510	0.523
<b>Bravery and Valour</b> - I tend to try out new things even if I don't feel very confident			0.433	0.698



Table 2

*Questionnaire items and loadings of CAASA after Study 2*

<b>Strengths</b>	<b>Self- Belief</b>	<b>Factor loadings</b>		<b>Uniqueness</b>
		<b>Social Competence</b>	<b>Curiosity &amp; Exploration</b>	
<b>Zest</b> - I tend to feel like life is very exciting	0.466			0.633
<b>Self-Regulation</b> -I feel able to keep my emotions in check	0.611			0.691
<b>Hope</b> - I feel positive even when I am not sure how things will go	0.634			0.516
<b>Honesty</b> - I feel like I can be honest with others	0.549			0.55
<b>Meaning</b> - I have the feeling life makes more sense	0.538			0.613
<b>Fairness</b> - I have to treat other people I am doing the activity with equally		0.671		0.511
<b>Humility</b> - I am happy to let other kids have the limelight		0.669		0.631
<b>Humour</b> - one of the main aims is to make people smile		0.695		0.449
<b>Kindness</b> -I tend to spend quite a bit of time helping		0.574		0.473
<b>Social Intelligence</b> - I try my best to get on well with everyone		0.396		0.586
<b>Perspective</b> - it helps a lot to put myself in other people's shoes		0.495		0.636
<b>Curiosity</b> - I find myself wanting to know more about what I am learning			0.776	0.455
<b>Love of learning</b> - I feel very excited by what I am discovering			0.662	0.429
<b>Bravery and Valour</b> -- I tend to try out new things even if I don't feel very confident			0.546	0.540
<b>Creativity</b> - I tend to think of new and different ways of doing thing			0.511	0.628

Table 3

*Means, standard deviations, and correlations of CAASA dimensions and measures used to test convergent validity*

Variable	<i>M</i>	<i>SD</i>	CAASA-Self-Belief	CAASA-Social Competence	CAASA-Curiosity & Exploration	ERS-ACA Self-Development	MYBS Peers	MYBS School
CAASA-Self-Belief	3.16	0.85						
CAASA-Social Competence	3.46	0.87	.56** [.48, .64]					
CAASA-Curiosity & Exploration	3.22	0.90	.50** [.41, .58]	.52** [.43, .60]				
ERS-ACA Self-Development	3.17	1.06	.72** [.66, .77]	.47** [.37, .55]	.56** [.48, .64]			
MYBS Peers	3.22	1.08	.59** [.51, .66]	.63** [.55, .69]	.37** [.27, .47]	.61** [.53, .68]		
MYBS School	3.33	1.05	.56** [.48, .64]	.58** [.50, .65]	.41** [.31, .50]	.64** [.57, .70]	.76** [.71, .81]	
AESTHEMOS Epistemic emotions	3.29	0.92	.56** [.48, .64]	.53** [.44, .61]	.65** [.57, .71]	.76** [.70, .80]	.54** [.45, .62]	.58** [.50, .65]

*Note.* *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. \* indicates  $p < .05$ . \*\* indicates  $p < .01$ .

Table 4

*Means, standard deviations, and correlations of CAASA dimensions and Personality*

Variable	<i>M</i>	<i>SD</i>	CAASA-Self-Belief	CAASA-Social Competence	CAASA-Curiosity and Exploration	TIPI Agreeableness	TIPI Extroversion	TIPI Neuroticism	TIPI Conscientiousness
CAASA-Self-Belief	3.16	0.85							
CAASA-Social Competence	3.46	0.87	.56** [.48, .64]						
CAASA-Curiosity and Exploration	3.22	0.90	.50** [.41, .58]	.52** [.43, .60]					
TIPI Agreeableness	3.69	0.88	.40** [.30, .50]	.43** [.33, .53]	.26** [.15, .37]				
TIPI Extroversion	3.04	1.06	.22** [.10, .33]	.03 [-.08, .15]	.11 [-.00, .23]	.14* [.02, .25]			
TIPI Neuroticism	2.64	0.94	-.45** [-.54, -.35]	-.24** [-.35, -.13]	-.24** [-.35, -.13]	-.36** [-.45, -.25]	-.35** [-.45, -.25]		
TIPI Conscientiousness	3.53	0.94	.40** [.29, .49]	.38** [.28, .48]	.24** [.12, .35]	.55** [.47, .63]	.19** [.07, .30]	-.37** [-.46, -.26]	
TIPI Openness	3.62	0.84	.44** [.35, .53]	.35** [.25, .45]	.43** [.33, .52]	.43** [.33, .52]	.29** [.18, .39]	-.31** [-.41, -.20]	.45** [.35, .54]

*Note.* *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. \* indicates  $p < .05$ . \*\* indicates  $p < .01$

Table 5

*Means, standard deviations, and correlations of CAASA and strengths and difficulties.*

Variable	<i>M</i>	<i>SD</i>	CAASA Self-Belief	CAASA Social Competence	CAASA Curiosity and Exploration	SDQ Pro-social	SDQ Peer problems	SDQ Emotional problems
CAASA-Self Belief	3.16	0.85						
CAASA-Social Competence	3.46	0.87	.56** [.48, .64]					
CAASA - Curiosity and Exploration	3.22	0.90	.50** [.41, .58]	.52** [.43, .60]				
SDQ Pro-social	6.90	2.28	.40** [.29, .49]	.54** [.45, .62]	.39** [.28, .48]			
SDQ Peer problems	2.78	1.88	-.29** [-.39, -.17]	-.12* [-.24, -.01]	-.04 [-.16, .08]	-.13* [-.24, -.01]		
SDQ Emotional problems	4.09	2.69	-.34** [-.44, -.23]	-.05 [-.17, .07]	-.07 [-.18, .05]	.02 [-.10, .14]	.47** [.37, .55]	
SDQ Hyperactivity	4.38	2.43	-.32** [-.42, -.21]	-.30** [-.41, -.19]	-.17** [-.28, -.05]	-.29** [-.39, -.17]	.21** [.10, .32]	.38** [.28, .48]

*Note.* *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. \* indicates  $p < .05$ . \*\* indicates  $p < .01$ .

