

1 **The effectiveness of brief animated films as a scalable micro-intervention to improve**
2 **children's body image: A randomised controlled trial**

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Abstract

Creating media to counteract the plethora of media and advertising that perpetuates negative body image is a scalable public health strategy that can be achieved through an innovative micro-intervention. This study examined the immediate and short-term (one-week follow-up) impact of viewing brief, evidence-informed animated films on young people's body image, media literacy, and self-efficacy in addressing appearance teasing. The animations were co-created through a partnership among academics, a personal care brand's social mission, and a children's television channel. Participants aged 7-14 ($N = 1329$, 49% girls) were randomised into one of three viewing conditions: Appearance Teasing & Bullying, Media & Celebrities, or a non-appearance-related animation. Contrary to predictions, all three animations were comparably effective at eliciting intervention effects. For girls and boys aged 7-10, all three animations immediately improved state body satisfaction (+boys aged 11-14; Cohens $d_s = .60 - .71$) and led to sustained improvements in trait media literacy (+girls aged 11-14; $d_s = .38 - .61$), sensitivity to appearance teasing (+boys aged 11-14; $d_s = .35 - .48$), and willingness to ignore appearance teasing (7-10 years only; $d_s = .34 - .74$) at one-week follow-up. Findings indicate that children's media is an effective medium for developing micro-interventions.

Keywords: micro-interventions, intervention, body image, children, media, edutainment

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1. Introduction

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1.1. Micro-interventions

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The use of micro-interventions to mitigate risk and enhance protective factors of

69 mental health is an emerging field of research. Micro-interventions aim to isolate brief,
70 immediately actionable therapeutic tasks to elicit immediate symptom relief (Elefant,
71 Contreras, Muñoz, Bunge, & Leykin, 2017). To date, intervention modalities include writing
72 tasks, instructional audios and/or videos, and smartphone technology (i.e., apps, chatbots,
73 games, etc). Single-session (e.g., Ahmedani, Crotty, Abdulhak, & Ondersma, 2015; Ayers,
74 Fitzgerald, & Thompson, 2015; Bunge, Beard, Stephens, Leykin, & Muñoz, 2017; Bunge,
75 Williamson, Cano, Leykin, & Muñoz, 2016; Elefant et al., 2017) and multi-session
76 interventions (Fuller-Tyszkiewicz et al., 2019; Meinlschmidt et al., 2016) have shown to
77 effectively alleviate psychological distress. Micro-interventions are advantageous as they are
78 generally designed to be self-guided, low cost, easily accessible, and have potential for wide-
79 scale reach and care. Thus, they may serve as a low-intensity standalone treatment for milder
80 symptomatology or as an adjunct to more traditional, intensive treatment.

81 Research concerning body image micro-interventions is in its infancy, with only one
82 extant study (Fuller-Tyszkiewicz et al., 2019). However, '*micro-intervention*' is a relatively
83 new term, and several existing body image interventions that were not labelled as such meet
84 the above criteria. For instance, single viewings of brief commercials that exposed
85 advertising and digital manipulation techniques (*Dove Evolution*; Halliwell Easun, &
86 Harcourt, 2011) or challenged narrow representations of women in exercise and sport (*This*
87 *Girl Can* and *#JoinTheMovement*; Mulgrew, McCulloch, Farren, Prichard, & Lim, 2018)
88 immediately protected adolescent girls from negative media exposure effects and improved
89 body satisfaction and exercise intent in adult women, respectively. Effects of *Dove Evolution*
90 have since been replicated (Quigg & Want, 2011) and contradicted (Cragg, Mulgrew, &
91 Kannis-Dymand, 2019). More recently, a purpose-built micro-intervention for body image
92 concerns (i.e., 11 mindfulness-based videos accessed online over a 21-day period; Fuller-
93 Tyszkiewicz et al., 2019) elicited immediate and short-term improvements in state and trait

94 body dissatisfaction, respectively. However, these effects did not generalise to other body
95 image-related outcomes (i.e., body image importance, eating disorder pathology, self-
96 esteem). Overall, there is preliminary support for single- and multi-session body image
97 micro-interventions among adolescent girls and women. However, additional research is
98 needed to determine the robustness of this intervention model and its applicability to younger
99 age groups and different genders.

100 **1.2. Children's Media and Body Image**

101 Children's media has the power to be both beneficial and detrimental to young
102 viewers' well-being. An extensive body of research supports the Tripartite Influence Model
103 (Thompson, Coover, & Stormer, 1999a; Thompson, Heinberg, Altabe, & Tantleff-Dunn,
104 1999b), which postulates that body dissatisfaction is associated with media consumption,
105 particularly exposure to appearance ideals promoted in mainstream media (Grabe, Ward, &
106 Hyde, 2008; Groesz, Levine, & Murnen, 2002; López-Guimerà, Levine, Sánchez-Carracedo,
107 & Fauquet, 2010). Children are exposed to appearance ideals from an early age, with content
108 analyses of films, books, and television highlighting an over-representation of narrowly
109 defined beauty ideals and derogatory stereotyping of diverse and unusual appearances (Klein
110 & Shiffman, 2006; McDade-Montez, Wallander, & Cameron, 2017; Robinson, Callister, &
111 Jankoski, 2008; Simpson, Kwitowski, Boutte, Gow, & Mazzeo, 2016). Protagonists are
112 typically conventionally attractive, have an 'ideal' physique (i.e., muscular or thin), and
113 possess positive personality traits (e.g., intelligent, high self-efficacy, prosocial).
114 Alternatively, antagonists are often characterised by facial features that do not conform to
115 cultural appearance ideals (e.g., large nose, warts, scars), higher body weight, and/or negative
116 personality traits (e.g., evil, lazy, stupid, gluttonous).

117 Limited research has examined the casual impact of viewing appearance ideal
118 animations on body image; however, of the research conducted, findings are conflicted. One

119 study reported increased body satisfaction post-exposure to appearance ideal animated
120 characters among six- to eight-year-old girls who internalised the thin ideal (Anschutz,
121 Engels, & Van Strien, 2012) while another study found no post-exposure effects for this type
122 of media with girls with a mean age of 4.44 years (Hayes & Tantleff-Dunn, 2010).
123 Collectively, these findings are consistent with previous research indicating that media
124 exposure does not impact the body image of children younger than six years old (Dohnt &
125 Tiggemann, 2006). Given that body image has shown to be well-established by mid-
126 adolescence (e.g., Rohde, Stice, & Marti, 2015), prevention attempts may be more effective
127 when applied to pre- and early adolescents, (i.e., 7-14 years) when body image is more
128 malleable (Hayes & Tantleff-Dunn, 2010; Smolak & Levine, 2001). Systematic reviews
129 support this notion, indicating that teaching pre- and early adolescents media literacy skills
130 (i.e., critically analysing messages portrayed in the media) is an effective prevention
131 approach for reducing the impact of appearance ideals on body image (McLean, Paxton, &
132 Wertheim, 2016a).

133 Children's media can also be a positive influence on emotional and intellectual
134 development (Fisch, 2004). *Edutainment*, entertainment with educational content, has shown
135 to be an effective model for improving children's academic performance and prosocial
136 behaviours (Fisch, 2004). Specifically, brief exposure to *Sesame Street*, a pioneer in
137 children's edutainment, has elicited problem-solving skills in children as young as five (e.g.,
138 100 seconds; Hodapp, 1977), with effects strengthened by repeated viewing (Sell, Ray &
139 Lovelace, 1995). The popular children's series also promotes prosocial attitudes and
140 behaviours, including the acceptance of diverse appearances, cultures, and races (e.g.,
141 Bernstein, 2000). This model has yet to be applied to body image, with no research
142 identifying *how* entertainment may deliver and model positive body image attitudes and
143 behaviours. Therefore, using the same medium that currently perpetuates negative body

144 image, instead to develop and disseminate material that disrupts and counteracts these
145 harmful effects, is a logical and imperative step in body image research.

146 **1.3. The Current Study**

147 Both the Tripartite Influence Model (Thompson et al., 1999a; Thompson et al.,
148 1999b) and Positive Body Image Theory (e.g., Menzel & Levine, 2011) were used as
149 frameworks for developing six, 60-second, evidence-based animations that target key risk
150 and protective factors for body image concerns identified in the model. The purpose-built
151 animations were co-created through a partnership with body image academics, a personal
152 care brand's social mission (the *Dove Self-Esteem Project*), and a television channel's
153 animated series (*Steven Universe [SU]* by *Cartoon Network*). Each animation addressed a
154 key risk or protective factor for negative body image among children and adolescents:
155 appearance-related teasing (titled *Teasing & Bullying*), appearance conversations (titled *Body*
156 *Talk*), appearance comparisons with friends (titled *Competing & Comparing Looks*), idealised
157 media (titled *Media & Celebrities*), body functionality (titled *Body Functionality*), and social
158 media use (titled *Social Media*). In 2018 and 2019, the animations were broadcast on
159 television and social media platforms (i.e., *Instagram* and *YouTube*). Since airing in May
160 2018, the six animations have been collectively viewed over 14.5 million times on social
161 media platforms, demonstrating the scalability of this intervention approach.

162 The current study aimed to examine the immediate and short-term impact of viewing
163 a sample of these 60-second animated films on children's and early adolescents' state and
164 trait measures of body image, media literacy, and self-efficacy in addressing appearance-
165 related teasing. The decision to assess two of the six animations (*Media & Celebrities*;
166 *Teasing & Bullying*) in comparison with an active control condition was informed by
167 available funding for recruitment and evaluation, the staggered timings for animation
168 development and broadcasting, and the pilot findings on acceptability. Several sets of

169 hypotheses were tested. First, it was hypothesised that state and trait body satisfaction would
170 be greater following exposure to the body-image-focused *SU* animations, relative to a *SU*
171 animation that did not focus on body image (active control condition). Second, it was
172 hypothesised that state and trait media literacy would be greater following exposure to the
173 *Media & Celebrities* animation, relative to the *Teasing & Bullying* and control animations.
174 Third, it was hypothesised that state and trait self-efficacy in addressing appearance-related
175 teasing would be greater following exposure to the *Teasing & Bullying* animation, relative to
176 the *Media & Celebrities* animation and control animations.

177 2. Method

178 2.1. Participants

179 The representative sample consisted of 1,329 girls and boys aged 7-14 ($M = 10.54$, SD
180 $= 2.15$) from six major US cities across eastern, central, and western regions, recruited by a
181 commercial research agency to participate in a study about children's media and well-being.
182 Inclusion criteria required participants to be aged 7-14; English speaking; watch > 2 hours of
183 television per week; and to not have participated in market research on advertising and
184 television in the preceding six months.

185 The above criteria were informed by the literature on body image developmental
186 milestones and existing data on *SU* viewership. Firstly, with respect to developmental
187 milestones and prevention program effectiveness, research indicates that body image is well
188 established by mid-adolescence (Rohde, Stice, & Marti, 2015). Therefore, research suggests
189 that administering prevention approaches during pre- and early adolescence may be more
190 successful, given that body image hasn't stabilised and body dissatisfaction is not yet a
191 normative discontent (e.g., Hayes & Tantleff-Dunn, 2010; Smolak & Levine, 2001). Further,
192 previous prevention programs that have targeted the same key risk factors and used similar
193 prevention content to the present study have proven effective at improving body image

194 among early adolescents (e.g., 11-13 years; Diedrichs et al., 2015). Lastly, market research
195 indicates that over a nine-month period (i.e., July 2019 – April 2020), 3.2 million children
196 aged 7-14 watched *SU*, indicating high acceptability and viewing within this age group
197 (Nielsen, 2020). Collectively, findings indicate that the targeted risk factors and intervention
198 content, coupled with the entertainment platform, is suitable for the selected age range.

199 An a priori power analysis assuming a moderate effect size (Cohen's $d = 0.40$), based
200 on research examining the impact of brief media exposure on young people's body image
201 (e.g., Grabe et al., 2008), specified that the sample size required to detect significance ($p <$
202 $.05$) was 99 students per gender (girl, boy) for each age group (7-10; 11-14 years) per arm
203 (Twisk, 2006). Therefore, this study was sufficiently powered to detect moderate to large
204 effects with 103-119 participants recruited per arm.

205 **2.2. Materials**

206 At the time of data collection, three 60-second animations were publicly available for
207 evaluation. Each clip portrayed *SU* characters engaging in a dialogue about a relevant body
208 image topic. A pilot study (described below) resulted in the selection of two body image-
209 related animations to evaluate alongside an active control animation in the main study.

210 **2.2.1. Animations**

211 The animations can be viewed online via this website: www.dove.com/cartoons.

212 **2.2.1.1. Appearance Teasing & Bullying.** This animation explored the impact of
213 appearance-related teasing and strategies to promote resilience to teasing (i.e., positive
214 appearance self-talk [e.g., "*I'm enough, just the way I am*"] and challenging bullying
215 behaviour) via two characters engaging in a dialogue.

216 **2.2.1.2. Media & Celebrities.** This animation explored the unrealistic nature of
217 idealised social media images, the negative effects associated with viewing and comparing
218 oneself to these images, and the importance of appearance acceptance and diversity.

219 **2.2.1.3. Active Control.** This animation did not refer to body image. It showed *SU*
220 characters engaging in recreational activities together (e.g., playing badminton, engaging in
221 card games, cooking).

222 **2.3. Measures**

223 **2.3.1. Demographics**

224 Children completed a self-report questionnaire consisting of demographics (i.e., age,
225 gender, and ethnicity) and state and trait measures pertaining to body image, media literacy,
226 and self-efficacy in addressing appearance teasing.

227 **2.3.2. State Outcomes**

228 **2.3.2.1. Body satisfaction.** Visual analogue scales (VAS; Heinberg & Thompson,
229 1995) assessed children's state level of body satisfaction. Items included: (1) "*How happy do*
230 *you feel about your body weight, right now?*" (2) "*How happy do you feel about your body*
231 *shape, right now?*" (3) "*How happy do you feel about the way you look, right now?*" Children
232 indicated their levels of satisfaction on a 10-point VAS (0 = *extreme dissatisfaction*; 10 =
233 *extreme satisfaction*). A mean score across the three items was calculated with higher scores
234 indicating higher state body satisfaction. The reliability and validity of VAS among children
235 has been widely reported, particularly for body satisfaction (Durkin & Paxton 2002; Heinberg
236 & Thompson 1995). Internal consistency in the current study was satisfactory (Cronbach's
237 alpha .85 and .75 for girls and boys, respectively).

238 **2.3.2.2. Media literacy.** A single item was created to assess immediate post-
239 intervention changes in media literacy, specifically in relation to the construct of realism
240 scepticism. Children were asked, "*Please show us how you are feeling right now. How much*
241 *do photos of models and celebrities in the media look like people you know? By media we*
242 *mean what you see on TV, in advertisements, in magazines, and online.*" Responses were
243 recorded on a five-point Likert scale (1 = *definitely do not look like people I know*; 5 =

244 *definitely look like people I know*). Scores were reverse scored, with higher scores indicating
245 greater media literacy.

246 **2.3.2.3. Self-efficacy towards bullying.** A single-item measure was created to assess
247 immediate changes in perceived self-efficacy in coping with appearance-related teasing and
248 bullying behaviours. Children were asked, "*Please show us how you are feeling right now.*
249 *How confident do you feel in dealing with teasing and bullying about appearance? By*
250 *appearance, we mean the way someone looks.*" Responses were recorded on a five-point
251 Likert scale (1 = *definitely not confident*; 5 = *definitely confident*), with higher scores
252 indicating greater self-efficacy.

253 **2.3.3. Trait Outcomes**

254 **2.3.3.1. Body satisfaction.** Trait body satisfaction was assessed using the Child Figure
255 Rating Scale (Tiggemann & Wilson-Barrett, 1998). This gender-specific scale is comprised
256 of nine female or male silhouettes of differing body sizes. Silhouettes are presented in
257 ascending order from left to right (1 = the thinnest physique; 9 = the largest physique).
258 Children were asked, "*Which picture looks most like you?*" (current figure), followed by
259 "*Which picture would you like to look like?*" (ideal figure). Body dissatisfaction was scored
260 by the size of the discrepancy between an individual's actual and ideal figures, with higher
261 scores indicating greater body dissatisfaction. Figure rating scales are commonly used to
262 assess body image among children (e.g., Gardner, 2001), with scales demonstrating sufficient
263 test-retest reliability (Collins, 1991). Internal consistency in the current study was satisfactory
264 (.75 and .79 for girls and boys, respectively).

265 **2.3.3.2. Media literacy.** The Realism Scepticism and Similarity Scepticism subscales
266 from the Media Attitudes Questionnaire (Irving, DuPen, & Berel, 1998) were adapted to
267 assess children's critical thinking in relation to idealised media images. The two realism
268 items assessed children's scepticism of idealised media images being realistic representations

269 of appearance (e.g., “*Most boys/girls my age look like the model in this ad*”; McLean, Paxton,
270 & Wertheim, 2016b). The three similarity items assessed the degree to which images were
271 perceived to be similar to one’s own and others’ experiences (e.g., “*I could be as*
272 *thin/muscular as the model in this ad*”). Based on the age and genders of the current
273 participants, the measure was adapted for comprehension and relevance. First, items were
274 modified to be gender-specific (i.e., reference to thinness for girls and muscularity for boys).
275 Further, to aid comprehension and control for the appearance of the media point of reference
276 (e.g., ethnicity, hair colour, fashion aesthetics), items were presented alongside five
277 advertisements of popular adolescent clothing and footwear brands featuring idealised
278 adolescent models, with realism and similarity scepticism items repeated for each image.
279 Children responded to items on a five-point Likert scale (1 = *completely disagree*; 5 =
280 *completely agree*). Items were reverse scored so that higher scores reflected greater
281 scepticism towards media images. A mean subscale score for each item was calculated across
282 responses to the five images for realism scepticism and similarity scepticism, respectively.
283 The two subscales have demonstrated satisfactory internal consistency, test-retest reliability,
284 and construct validity in adolescents (McLean et al., 2016b). Internal consistency of the
285 current realism scepticism (.82 and .89 for girls and boys, respectively) and similarity
286 scepticism subscales (.78 and .80 for girls and boys, respectively) were satisfactory.

287 **2.3.3.3. *Self-efficacy towards bullying.*** The Readiness to Object to Bullying measure
288 (Rigby & Johnson, 2006) was adapted to assess perceived self-efficacy in addressing
289 appearance-related teasing and bullying. The measure was adapted to include written
290 appearance-related teasing vignettes, rather than images depicting more general teasing.
291 Twelve vignettes were developed describing acne-, height-, weight-, and visible difference-
292 based teasing. The pilot study (described below) assessed children’s comprehension of the
293 vignettes, as well as how similar they were to real-life scenarios. Based on these ratings, six

294 vignettes were selected (two acne, two weight, and two visible difference) and presented
295 alongside one sensitivity to teasing item (“*If this happened to you, would you be upset?*”) and
296 four behavioural responses (*join in with the bullying, ignore the bullying, tell a trusted adult,*
297 *tell the bully to stop*). To account for age appropriateness, participants aged 7-10 only viewed
298 vignettes related to height-, weight-, and visible difference-based teasing (i.e., not acne-based
299 teasing). Meanwhile, participants aged 11-14 viewed all categories of teasing vignettes.
300 Children responded to items on a five-point Likert scale (1 = *I definitely would not*; 5 = *I*
301 *definitely would*), with higher scores indicating greater sensitivity and engagement in
302 behaviours. The five items (sensitivity, join in, ignore, tell an adult, and stop the bully) were
303 not correlated and were therefore analysed individually.

304 **2.4. Pilot Study**

305 One hundred girls ($n = 47$) and boys ($n = 53$) aged 7-14 ($M = 10.44$, $SD = 2.29$) from
306 the US were recruited by a research agency and participated in an online pilot study assessing
307 the acceptability of four 60-second *SU* animations and comprehension of the adapted and
308 purpose-built measures. The animations included three body image-related animations:
309 *Appearance Teasing & Bullying, Media & Celebrities* (both described under Materials), and
310 *Body Talk* (i.e., exploring how everyday appearance conversations and comments can
311 negatively influence body image). The fourth, the active control, was an appearance-neutral
312 animation. Acceptability was operationalised as enjoyment, interest, similarity to current
313 viewing, and likelihood to recommend the film to a friend, with each factor assessed on five-
314 point Likert scales (e.g., 1 = *definitely not interesting*, 5 = *definitely interesting*).
315 Comprehension of animation content was assessed using a recall questionnaire. Participants
316 were presented with eight statements relating to their allocated videos and were asked to
317 recall which items were true or false. Participants scored 0 for incorrectly recalling an item
318 and 1 for correctly recalling an item, with higher scores indicating greater attention to

319 content.

320 Due to the age of the sample, several validated outcome measures were adapted to aid
321 comprehension, while several were purpose-built (i.e., state media literacy, state self-efficacy
322 towards teasing, and trait body talk) due to no existing measures. Children's understanding of
323 these measures was assessed in the pilot study. Measures included state and trait measures of
324 body talk (informed by Arroyo & Andersen, 2016; Britton et al., 2006), media literacy
325 (adapted from Media Attitudes Questionnaire, Irving et al., 1998), and self-efficacy towards
326 bullying behaviours (adapted from Readiness to Object to Bullying measure Rigby &
327 Johnson, 2006). Comprehension was indicated by either answering the scale item as
328 instructed or selecting the '*I don't understand this question*' option. Children reported on
329 comprehension of state and trait measures and were then randomised to view and rate two of
330 the four animations. Children received recruitment agency credit for participating. The
331 university's Research Ethics Committee approved this study.

332 A series of one-way analysis of variance assessed groups differences (Appearance
333 Teasing & Bullying, Body Talk, Media & Celebrities, control) on acceptability and
334 comprehension scores. Scores were assessed separately for age groups (i.e., 7-10 and 11-14
335 years) and genders (i.e., girls and boys). There were no significant differences among the
336 groups on acceptability across ages and genders, with all four animations scoring moderate to
337 high on overall acceptability (mean ranges 3.98 – 4.12 out of 5). Further, all four animations
338 were associated with moderate to high recall (mean ranges 5.33 – 6.50 out of 8). Recall
339 scores were significantly greater in the Appearance Teasing & Bullying group, relative to the
340 Body Talk and control groups; however, no differences were observed among the Media &
341 Celebrities, Body Talk, and control groups. Lastly, the majority of children comprehended
342 the state and trait measures (85-100%). There was only scope to recruit a sample large
343 enough to evaluate two intervention films in the main study. Therefore, although each piloted

344 body image animation addressed robust risk factors and they were equally acceptable, the
345 authors selected *Appearance Teasing & Bullying* and *Media & Celebrities* animations for
346 evaluation in the main study on the basis that these factors are among the most robust
347 predictors of body satisfaction during childhood and adolescence (e.g., Groesz, Levine, &
348 Murnen, 2001; Menzel et al., 2010). Therefore, the impact of these two animations on body
349 image, as well as related attitudes and behaviours were assessed in a randomised controlled
350 trial (the main study), relative to an active control animation.

351 **2.5. Procedure**

352 The randomised controlled trial consisted of two phases: a face-to-face testing session
353 (Phase 1) and an online follow-up questionnaire completed at home (Phase 2). Parent and
354 child consent were attained prior to participation. In Phase 1, children attended a central
355 location testing facility in their respective city where they completed study tasks under
356 standardised conditions. First, children were randomly assigned to one of three viewing
357 conditions using the randomisation by minimisation function in *Qualtrics*. Second, children
358 were assessed on demographics and pre-exposure state outcomes. Third, children were
359 individually exposed twice in immediate succession to their assigned 60-second animation to
360 allow for adequate comprehension of their film's messages, in accordance with other similar
361 studies (e.g., Halliwell et al., 2011). Fourth, children completed post-exposure state
362 outcomes, followed by trait measures. At completion, children were informed of the next
363 phase of the study. One week following the face-to-face testing session (Phase 2), children
364 completed an at-home, online follow-up questionnaire to assess sustained effects of viewing
365 the animated films on trait measures. At completion, parents and children were debriefed and
366 provided with body image resources. Children received agency credit for the participation in
367 both phases. The university's Research Ethics Committee approved this study.

368 **2.6. Statistical Analyses**

394 **3.2. The Effect of Viewing Condition on State Outcomes**

395 As per Table 2, there was a main effect of time for state body satisfaction for boys
396 aged 7-14 and girls aged 7-10, but not for girls aged 11-14. Significant main effects of
397 condition were observed for boys aged 7-14; however, no significant interactions between
398 time and condition were observed across the two age groups and genders. Post-hoc analyses
399 conducted on main effects of time for body satisfaction (Table 2) indicated that girls (7-10
400 years) and boys (7-14 years) in all animation conditions experienced significant moderate
401 improvements in body satisfaction; analyses on main effects of condition indicated no
402 significant differences between groups. No significant main effects of time or condition nor
403 significant interactions were observed for state media literacy and self-efficacy.

404 **3.3. The Effect of Viewing Condition on Trait Outcomes**

405 **3.3.1. Body satisfaction.** As shown in Table 3, there were no main effects of time or
406 condition nor an interaction for children's trait body satisfaction.

407 **3.3.2. Media literacy.** For realism scepticism, there was a significant main effect of
408 time for girls aged 7-14 and boys aged 7-10, but not for boys aged 11-14; no main effects of
409 condition nor interaction were observed. For similarity scepticism, a significant main effect
410 of time for boys aged 7-14 was observed; however, no main effect of condition nor
411 interaction was observed. No significant effects or interactions were observed for girls.

412 Post-hoc analyses conducted on main effects of time for realism scepticism (see Table
413 3) indicated that boys (7-10 years) and girls (7-14 years) in all animation conditions
414 experienced significant moderate improvements in scepticism. Meanwhile, for similarity
415 scepticism, boys aged 7-14 in all conditions experienced significant small reductions in
416 scepticism.

417 **3.3.3. Self-efficacy towards bullying.** For sensitivity towards bullying behaviours,
418 there was a main effect of time for boys aged 7-14 and girls aged 7-10, but not for girls aged

419 11-14. Significant main effects of condition were observed for boys aged 7-10; however, no
420 significant interactions between time and condition were observed across age groups or
421 genders. Post-hoc analyses conducted on main effects of time indicated significant moderate
422 improvements in girls' and boys' sensitivity towards bullying behaviours.

423 For willingness to join in on bullying behaviours, there was a main effect of time for
424 boys aged 7-14 and a significant main effect of condition for boys aged 11-14, but not for
425 boys aged 7-10; no significant interaction between time and condition was observed for either
426 age group. No significant effects or interactions were observed for girls. Post-hoc analyses
427 conducted on main effects of time and condition indicated that reductions in boys'
428 willingness to join in on bullying behaviours did not significantly differ between pre- and
429 post-exposure nor among conditions.

430 For willingness to ignore bullying behaviours, there was a significant main effect of
431 time for girls aged 7-14 and boys aged 7-10, but not for boys aged 11-14; no main effects of
432 condition nor interaction were observed. Post-hoc analyses conducted on main effects of time
433 indicated significant moderate to large reductions in 7-10 year-old girls' and boys'
434 willingness to ignore bullying behaviours. Effects were not significant for girls aged 11-14.

435 For willingness to tell an adult about bullying behaviours, there was a main effect of
436 time for girls aged 11-14 and boys aged 7-10; no significant main effects of condition or
437 interaction between time and condition were observed. No significant effects or interactions
438 were observed for girls aged 7-10 and boys aged 11-14. Post-hoc analyses on the main effects
439 of time indicated significant small reductions in girls' willingness to speak with a trusted
440 adult about bullying behaviours; effect sizes were not significant for boys.

441 For willingness to tell a bully to stop, there was a main effect of time for girls aged 7-
442 14 and boys aged 7-10, but not for boys aged 11-14. No significant main effects of condition
443 or interaction between time and condition were observed. Post-hoc analyses on the main

444 effects of time indicated significant small to moderate reductions in girls' willingness to tell a
445 bully to stop; effect sizes were not significant for boys.

446 **4. Discussion**

447 The current study evaluated the impact of viewing brief, evidence-informed
448 animations on children's body image, media literacy, and self-efficacy in addressing
449 appearance teasing and bullying. An overarching finding was the comparable effectiveness of
450 the active control condition at improving key outcomes, relative to the two intervention
451 conditions. Contrary to predictions, all three animations led to significant improvements in
452 state body satisfaction (girls 7-10 years; boys 7-14 years) and neither intervention condition
453 led to symptom-specific changes in state outcomes (i.e., media literacy and self-efficacy).
454 Further, unexpectedly, all three intervention conditions elicited significant improvements in
455 trait media literacy (realism scepticism in girls 7-14 years and boys 7-10 years) in addition to
456 several self-efficacy traits in addressing teasing and bullying behaviours. These included
457 improvements in sensitivity to appearance teasing behaviours (girls 7-10 years; boys 7-14
458 years), as well as reductions in children's willingness to ignore appearance teasing
459 behaviours (girls and boys 7-10 years). The current findings support previous evidence that
460 micro-interventions are effective at immediately improving state-based body image (Fuller-
461 Tyszkiewicz et al., 2019; Mulgrew et al, 2018). However, this is the first study to
462 demonstrate sustained short-term (1-week follow-up) effects of micro-interventions on
463 children's body image, a novel finding that warrants replication and further investigation.
464 Lastly, contrary to predictions, all three animations adversely affected aspects of trait media
465 literacy and trait self-efficacy. Specifically, all three animations led to reduced similarity
466 scepticism in boys aged 7-14, and girls' willingness to tell an adult about teasing behaviours
467 (7-14 years), as well as asking a bully to stop (11-14 years).

468 The active control condition was equally effective as the two intervention conditions

469 at eliciting improvements in the key outcomes. This finding might be understood in a number
470 of ways. Firstly, comparable effects may be due to the diverse and inclusive nature of *SU*
471 characters. The control animation did not contain explicit body image content, but it
472 displayed characters of diverse appearances engaging in non-appearance related activities
473 (i.e., badminton, card games, cooking, and watching television). These effects align with
474 previous research into the positive exposure effects of viewing more diverse-sized bodies on
475 body image, relative to appearance ideals (Halliwell & Dittmar, 2004; Halliwell, Dittmar, &
476 Howe, 2005; Diedrichs & Lee, 2010; Diedrichs & Lee, 2011). While research has explored
477 the negative effects associated with viewing animated appearance ideals on children's body
478 image (Anschutz et al., 2012; Slater, Halliwell, Jarman, & Gaskin, 2017), no studies have
479 explored the possible protective properties associated with animations that incorporate
480 positive and inclusive depictions of characters with diverse appearances (e.g., different body
481 shapes, sizes, and facial features). Future research should extend on these findings and
482 consider the effects of appearance-inclusive and diverse animations on other body image-
483 related attitudes and behaviours, including weight bias and stereotypes. Second, active
484 control condition effects are not uncommon among micro- and standard intervention studies
485 (e.g., Becker, Smith & Ciao, 2006; Bunge et al., 2016). These effects may be attributed to
486 study characteristics, including placebo, demand and/or practice effects, positive self-regard
487 for participating in research, or support and attention from the researcher(s) (Salemink, Kindt,
488 Rienties, & van den Hout, 2014). To delineate the protective properties of the current control
489 condition, future designs would benefit from incorporating two additional active control
490 conditions: an appearance ideal animation and a non-human animation.

491 To our knowledge, this is the first study to assess state-based (e.g., in the moment)
492 properties of media literacy and self-efficacy. Assessments of these constructs have
493 traditionally been conducted using trait-based measures to assess for short- and/or long-term

494 change (e.g., McLean et al., 2016b). Further, no research has explored brief, low-intensity
495 interventions at improving these body image-related risk factors. It is unclear as to why the
496 current micro-interventions did not have an immediate impact on state media literacy but
497 were moderately effective at eliciting improvements in trait media literacy (Cohen's *d*
498 ranging between .38 - .61) and self-efficacy in addressing teasing and bullying (*d* ranging
499 between .24 - .74) at one-week follow-up. Existing media literacy programs that lead to trait-
500 based changes, which at times address appearance teasing and bullying, are at minimum 45-
501 minutes long and typically include multiple sessions (McLean et al., 2016b). The current
502 findings offer preliminary support for the use of micro-interventions in improving trait media
503 literacy and trait self-efficacy and may be a cost- and time-effective tool to complement more
504 intensive interventions.

505 Three unexpected effects emerged: a *reduction* in girls' willingness to advise a trusted
506 adult about bullying behaviours and to ask a bully to stop, and a *reduction* in boys'
507 scepticism that they and their peers could achieve an idealistic appearance. One possible
508 explanation for these reductions between post-exposure and follow-up is a return to baseline
509 levels of willingness and scepticism. Given that baseline assessments of these constructs were
510 not conducted prior to exposure to avoid demand characteristics, the trajectory of change
511 from baseline to post-exposure and follow-up is unknown. Future designs should incorporate
512 assessments of protective and risk factors one week prior to the experimental component of
513 the study. A second explanation for girls' reduced willingness may relate to measure
514 constraints. The current measure presented children with coping strategies for face-to-face
515 bullying traditionally referenced in the bullying literature (e.g., Kärnä et al., 2011). However,
516 it is possible that these strategies do not fully capture alternative strategies that may be more
517 readily endorsed and used amongst children and pre-adolescents today (e.g., use humour, tell
518 a friend, report online, or already feel equipped to cope). There are currently no validated

519 measures that assess children's coping strategies for appearance teasing and bullying, either
520 in a face-to-face or cyber context. The development and validation of an appearance teasing
521 coping measure for children and pre-adolescents is imperative, given the risk associated with
522 appearance teasing and body image concerns (e.g., Menzel et al., 2010). A final explanation
523 for the observed findings may relate to practice effects, which can be associated with
524 repeated measure designs. However, this is unlikely to due to the limited number of
525 assessments (i.e., two assessment points) and the extended time between them (i.e., one-week
526 gap).

527 Overall, micro-intervention effects were more consistent for girls and boys aged 7-10,
528 relative to those aged 11-14. Given that body image concerns are thought to be most salient
529 during mid- to late-adolescence (e.g., Rohde, Stice, & Marti, 2015), micro-interventions
530 targeting this population, particularly for those who are at greater risk of body image
531 concerns (i.e., adolescent girls), may require more explicit, intensive material over a series of
532 multiple sessions. Future investigations into the impact of multi-session (e.g., daily usage),
533 multi-activity (e.g., psychoeducation videos, written and physical tasks) micro-interventions
534 addressing children's and adolescents' body image and associated protective factors would be
535 useful.

536 **4.1. Limitations and Future Directions**

537 Inclusion criteria required children to be familiar with the *SU* cartoon series, and
538 therefore effects may not generalise to those who are unfamiliar with this series. The capacity
539 model postulates that children's processing of educational content is impacted by their
540 familiarity with and relatability to a narrative (Fisch, 2004). Specifically, the less familiar and
541 relatable, the greater the cognitive load required to process both narrative and educational
542 content. Given that the animations were very brief, familiarity with *SU* characters and
543 storylines was thought to strengthen the salience of key educational messages, and therefore

544 increase intervention effects. Further, the selection of this population likely increased the
545 ecological validity of the study as the animations were broadcast on a television network and
546 online platforms (i.e., *YouTube* channels) that air *SU*.

547 A second limitation was the adaptation of validated measures due to the lack of
548 existing body image measures for use concurrently among children and pre-adolescents.
549 Assessment of body image in children remains underdeveloped, relative to adolescent and
550 adult populations (see Smolak, 2004 for review). Although the current adapted measures have
551 yet to be validated in younger populations, they closely resemble the original measures;
552 adaptations were made solely for aiding comprehension. Further, the Cronbach's alphas of
553 the current measures indicated strong internal validity, which bolsters confidence that the
554 current measures assessed the targeted outcome.

555 **4.2. Implications**

556 Despite these limitations, the current research offers preliminary evidence for the use
557 of micro-interventions to improve children's body image, an avenue of research unexplored
558 until now. The current micro-interventions were effective at eliciting both immediate and
559 short-term improvements in protective factors for body image (i.e., media literacy and self-
560 efficacy); however, whether these effects are sustainable beyond one week is unknown. More
561 research exploring multi-session, multi-activity micro-interventions is needed, as well as
562 longer-term follow-ups to determine the magnitude and duration of change associated with
563 these brief, low-intensity models of care. Further, the current research was conducted in a
564 highly-controlled experimental setting, a necessary first step in the evaluation of intervention
565 efficacy (Singal, Higgins, & Waljee, 2014). However, a strength of micro-interventions is
566 their independence from healthcare professionals and settings. Therefore, moving
567 investigations to real-world settings will increase our understanding of their effectiveness.

568 The positive effects of the control condition on children's well-being suggests that *SU*

569 is a progressive animation that avoids the detrimental impact on well-being observed with
570 other forms of children's media. In light of the unwavering negative effects associated with
571 animated and real-world appearance ideals portrayed in media, television networks are
572 encouraged to consider the impact their shows have on viewers' well-being. Micro-
573 interventions offer television networks the opportunity to embed edutainment content into
574 their advertising schedules, a space traditionally overrun by appearance ideals, to improve
575 well-being while still maintaining viewers' interest and attention.

576 **4.3. Conclusion**

577 The use of micro-interventions to improve body image is an emerging field. The
578 current study is the first to examine the effects of micro-interventions on children's body
579 image and associated protective factors. Overall, the animations were effective at eliciting
580 immediate and improvements in state body satisfaction and short-term improvements in trait
581 media literacy and self-efficacy, with effects most consistent for younger children, relative to
582 pre-adolescents. It remains unclear as to why several unexpected effects were observed
583 across all three groups at follow-up (i.e., reduced similarity scepticism and willingness to
584 address bullying behaviours). However, with additional assessment points, a clearer
585 trajectory of change in outcomes is likely. Overall, the current study highlights how academia
586 and industry can collaborate to produce theoretically-driven and innovative children's media
587 content that is cost-effective, scalable, and effective at promoting mental health.

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819

Footnotes

820 ¹ An ANCOVA was conducted on group differences in boys' satisfaction at post-exposure,
821 whilst controlling for baseline satisfaction levels. Findings from the ANCOVA reflected that of
822 the Linear Mixed Models (LMM), whereby the main effect of condition was not significant.
823 Therefore, for uniformity and ease of interpretation, findings of the LMM analyses are reported.

824

Table 1

Participants' baseline characteristics

	Girls								Boys							
	7-10 years				11-14 years				7-10 years				11-14 years			
	ATB n=119	MC n=113	C n=99	F(p)	ATB n=103	MC n=108	C n=124	F(p)	ATB n=116	MC n=103	C n=117	F(p)	ATB n=104	MC n=117	C n=106	F(p)
<i>Demographics</i>																
Age (<i>M, SD</i>)	8.66 (1.14)	8.67 (1.06)	8.86 (1.03)	1.33 (.27)	12.39 (1.20)	12.30 (1.15)	12.33 (1.08)	.20 (.82)	8.66 (1.10)	8.73 (1.09)	8.66 (1.09)	.84 (.43)	12.61 (1.12)	12.47 (1.05)	12.30 (1.12)	2.31 (.10)
Ethnicity (<i>n</i> of subsample)																
American Indian and/or Alaska Native	1	3	2		1	3	2		2	2	0		2	2	0	
Asian	2	6	7		2	7	6		4	1	2		4	1	2	
Black	34	25	36		34	25	36		28	30	27		28	30	27	
Native Hawaiian and/or Pacific Islander	3	0	1		3	0	1		2	0	0		2	0	0	
White	62	59	59		62	59	59		70	73	60		70	73	60	
Other	14	9	11		14	9	11		13	7	10		13	7	10	
I don't know	0	0	2		0	0	2		0	0	0		0	0	0	
<i>State outcomes (M, SE)</i>																
Body Satisfaction	8.35 1.83 (1.91)	8.11 1.83 (1.93)	8.43 1.83 (1.93)	.78 (.46)	7.55 2.61 (2.20)	7.37 2.72 (2.41)	7.35 2.67 (2.44)	.21 (.34) (.81)	8.14 2.66 (2.01)	8.36 2.71 (1.74)	7.68 2.52 (2.01)	3.25 (.84) (.04)	7.88 2.72 (1.85)	8.02 2.69 (1.77)	8.48 2.73 (1.48)	3.94 (.07) (.02)
Media literacy	2.87 (1.03)	2.82 (1.09)	2.73 (1.05)	.45 (.64)	2.61 (1.06)	2.72 (.99)	2.67 (.01)	.34 (.72)	2.66 (.95)	2.71 (1.19)	2.52 (1.20)	.84 (.43)	2.72 (.93)	2.69 (1.03)	2.73 (1.01)	.07 (.94)
Self-efficacy	3.16 (1.37)	3.35 (1.23)	3.13 (1.44)	.88 (.42)	3.38 (1.20)	3.27 (1.16)	3.28 (1.39)	.22 (.81)	3.11 (1.38)	3.12 (1.38)	3.12 (1.35)	.48 (.62)	3.71 (1.06)	3.48 (1.23)	3.77 (1.13)	1.99 (.14)

Note. ATB = appearance teasing and bullying condition; MC = media & celebrities condition; C = control condition.

Table 2.

State outcomes: Impact of animations between pre- and immediate post- exposure

		Girls							Boys								
		7-10 years			11-14 years				7-10 years			11-14 years					
		<i>df</i>	<i>F</i>	<i>P</i>	<i>d</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>d</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>d</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>d</i>
Body satisfaction																	
	Time	1, 183	18.01	<.001	.68	1, 188	1.69	.20	-	1, 145	1.51	<.001	.71	1, 156	7.25	.01	.60
	Condition	2, 123	1.39	.25	-	2, 131	.22	.80	-	2, 122	4.69	.01	-	2, 130	3.69	.03	-
	Time x condition	2, 124	.14	.87	-	2, 129	.32	.31	-	2, 121	.30	.74	-	2, 120	.31	.74	-
Media literacy																	
	Time		<i>LRT</i>	<i>P</i>	<i>d</i>		<i>LRT</i>	<i>p</i>	<i>d</i>		<i>LRT</i>	<i>p</i>	<i>d</i>		<i>LRT</i>	<i>p</i>	<i>d</i>
	Condition		.52	.48	-		.06	.78	-		2.00	1.44	-		.03	.86	-
	Time x condition		2.19	.36	-		1.52	.51	-		2.44	.31	-		.63	.74	-
Self-efficacy																	
	Time		<i>LRT</i>	<i>P</i>	<i>d</i>		<i>LRT</i>	<i>p</i>	<i>d</i>		<i>LRT</i>	<i>p</i>	<i>d</i>		<i>LRT</i>	<i>p</i>	<i>d</i>
	Condition		.00	.94	-		.28	.59	-		.34	.57	-		.16	.67	-
	Time x condition		1.17	.56	-		.93	.62	-		1.72	.39	-		4.10	.13	-
	Time x condition		.14	.83	-		2.49	.310	-		.51	.79	-		2.95	.24	-

Note. *LRT* = Likelihood ratio test value; *d* = Cohen's *d* effect sizes reported for significant main effects and interactions. Significant effect sizes are **bolded**.

Table 3

Trait outcomes: Impact of animations between post-exposure and 1-week follow-up

		Girls						Boys					
		7-10 years			11-14 years			7-10 years			11-14 years		
		LRT	p	d	LRT	p	d	LRT	p	d	LRT	p	d
<i>Body satisfaction</i>													
	Time	.28	.60	-	.39	.53	-	.20	.65	-	3.32	.06	-
	Condition	.22	.88	-	7.26	.02	-	1.24	.54	-	.42	.80	-
	Time x condition	1.33	.50	-	.52	.79	-	10.37	<.01	-	.95	.64	-
<i>Realism scepticism</i>													
	Time	26.27	.001	.61	18.21	.001	.52	9.97	.001	.38	.11	.71	-
	Condition	2.49	.29	-	5.23	.07	-	1.20	.55	-	.87	.70	-
	Time x condition	.12	.96	-	4.36	.10	-	.25	.89	-	2.37	.32	-
<i>Similarity scepticism</i>													
	Time	.65	.43	-	.03	.85	-	4.98	.03	.26	6.66	.01	.29
	Condition	.09	.6	-	2.12	.40	-	3.40	.15	-	.93	.61	-
	Time x condition	.39	.83	-	.48	.78	-	1.13	.58	-	1.87	.39	-
		<i>df</i>	<i>F</i>	<i>p</i>	<i>d</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>d</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>d</i>
<i>Self-efficacy towards bullying behaviours</i>													
	Time	1, 166	8.23	.01	.48	1, 145	2.68	.10	-	1, 159	9.05	.01	.38
	Condition	2, 122	3.78	.03	-	2, 118	.34	.71	-	2, 109	2.17	.12	-
	Time x condition	2, 113	.35	.70	-	2, 117	.04	.96	-	2, 108	2.32	.10	-
<i>Sensitivity</i>													
	Time	1, 166	8.23	.01	.48	1, 145	2.68	.10	-	1, 159	9.05	.01	.38
	Condition	2, 122	3.78	.03	-	2, 118	.34	.71	-	2, 109	2.17	.12	-
	Time x condition	2, 113	.35	.70	-	2, 117	.04	.96	-	2, 108	2.32	.10	-

<i>Join in</i>																	
Time	1, 135	2.84	.09	-	1, 115	.00	.99	-	1, 159	10.50	.001	.04	1, 118	3.97	.05	-	
Condition	2, 95	1.70	.18	-	2, 117	.27	.76	-	2, 110	1.92	.15	-	2, 117	4.75	.01	-	
Time x condition	2, 98	1.0	.35	-	2, 114	.28	.76	-	2, 109	1.44	.24	-	2, 110	.89	.41	-	
	1, 135	2.84	.09	-	1, 115	.00	.99	-									
<i>Ignore</i>																	
Time	1, 152	4.05	.05	.34	1, 177	4.66	.03	-.2	1, 166	11.76	<.00 1	.74	1, 149	.25	.62	-	
Condition	2, 111	2.59	.08	-	2, 116	.43	.65	-	2, 111	.13	.88	-	2, 119	5.01	.01	-	
Time x condition	2,106	1.06	.35	-	2, 120	.95	.38	-	2, 111	.27	.76	-	2, 114	2.50	.09	-	
<i>Tell an adult</i>																	
Time	1, 161	.43	.51	-	1, 156	4.62	.03	.24	1, 151	4.36	.04	.06	1, 142	.00	.95	-	
Condition	2, 114	.23	.7	-	2, 117	1.54	.22	-	2, 107	1.21	.30	-	2, 119	1.30	.28	-	
Time x condition	2, 112	.18	.83	-	2, 118	.01	.99	-	2, 107	1.14	.32	-	2, 113	1.21	.30	-	
<i>Tell bully to stop</i>																	
Time	1, 169	6.29	.01	.30	1, 175	10.9 0	.00 1	.45	1, 153	5.47	.02	.11	1, 152	.53	.47	-	
Condition	2, 114	1.10	.34	-	2, 117	.21	.81	-	2, 109	.23	.80	-	2, 119	2.86	.06	-	
Time x condition	2, 114	.45	.64	-	2, 120	.28	.76	-	2, 107	1.26	.29	-	2, 115	.41	.66	-	

Note. LRT = Likelihood ratio test value; d = Cohen's d effect sizes reported for significant main effects and interactions. Significant effect sizes are **bolded**.

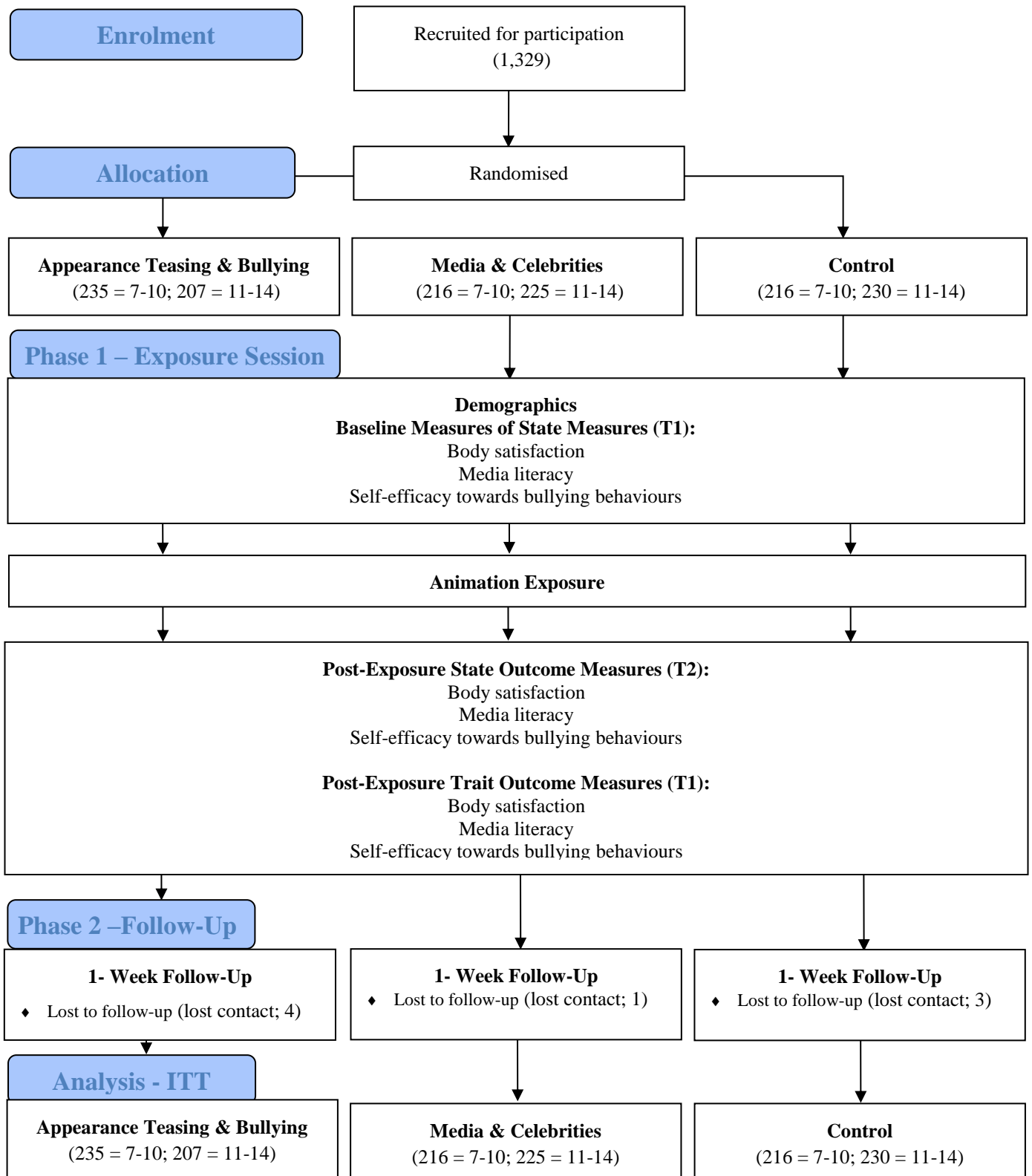


Figure 1. Research design and participant flow