1   **Abstract**

2   This study tested whether age moderates the longitudinal relationships between upward and

3   downward comparisons on Instagram and three identity processes (i.e., commitment, in-depth

4   exploration, and reconsideration of commitment). Two hundred and eleven British emerging adults

5   completed two self-report surveys, two months apart, in early 2020. A cross-lagged panel model with

6   interaction terms found that age moderated the relationships between both upward and downward

7   comparisons on Instagram and commitment. Contingent moderations were found: the relationship

8   between upward comparisons and commitment was negative for older participants, whilst the

9   relationship between downward comparisons and commitment was negative for younger participants.

10 Significant age differences were not found in the paths between the comparison behaviours and the

11 two exploratory processes. Findings therefore provide evidence to suggest that developmental factors

12 may inform the identity implications of social comparisons on Instagram during emerging adulthood,

13 and thus, developmental sensitivity is required when supporting emerging adults to navigate the

14 platform.

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17 **Keywords** Emerging Adulthood; Identity Development; Identity Processes; Instagram; Social

18 Comparison

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Introduction

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28   Social comparisons are valuable tools for learning about the self, and social networking sites

29   (SNSs) such as Instagram have provided young people with convenient outlets for social comparison.

30   Perhaps unsurprisingly, initial evidence suggests that social comparisons on SNSs may inform the

31   process of identity development (e.g., Noon et al., 2021; Noon, 2020; Yang, 2021), a key

32   developmental task during emerging adulthood (ages 18-29) (Arnett, 2000; Erikson, 1950). However,

33   the existing literature has several limitations which this study intends to address.

34   First, existing research has tended to examine the relationships between non-directional or

35   'neutral' measures of social comparison behaviour and identity-related constructs. However,

36   comparisons between the self and others are never non-directional; instead, they are often framed in

37   terms of upward and downward comparisons (Guyer & Vaughan-Johnston, 2018). As upward and

38   downward comparisons represent distinct psychological processes (Buunk et al., 1990) and tend to

39   occur with differing degrees of frequency on SNSs (Midgley, 2020), it is necessary to differentiate

40   between these behaviours to generate a more nuanced understanding of their identity implications.

41   This investigation therefore determines the associations between upward and downward comparisons

42   on SNSs and three key identity processes (i.e., commitment, in-depth exploration, and reconsideration

43   of commitment). Specifically, this study considers the identity implications of upward and downward

44   comparisons on Instagram, as this platform is not only highly popular amongst emerging adults, but

45   the visual self-related content that is typically shared on Instagram also lends itself well to social

46   comparison behaviour (Jiang & Ngien 2020).

47   Second, whilst the social psychological literature has identified several factors which can

48   influence the outcomes of social comparisons (e.g., Lockwood & Kunda, 1997; Stapel & Koomen,

49   2000), little is currently known about the moderators which may inform the identity implications of

50   social comparisons on SNSs. However, initial evidence indicates that due to the progressive nature of

51   identity development, the consequences of social comparisons on Instagram may differ in accordance

52   with age (Noon et al., 2021). Thus, this investigation also examines whether age moderates the

53   associations between upward and downward comparisons on Instagram and three identity processes.

54   Finally, much of the existing research has focused on the outcomes, rather than the drivers, of

55   social comparisons on SNSs. Yet, such behaviour is often utilised to fulfil individuals' self-related

56   needs (Corcoran et al., 2011). It is therefore possible that emerging adults' sense of identity and/or

57   their desire to explore their identity may trigger social comparison behaviour. Thus, this investigation

58   utilises a longitudinal cross-lagged panel design to explore the bi-directional associations between

59   three identity processes and upward and downward comparisons on Instagram.

60

61   **Identity Development**

62   During adolescence and emerging adulthood, significant biological, psychological, and social

63   changes often provoke uncertainty regarding self, relationships, and place in the world. To overcome

64   this uncertainty, young people are required to reflect on who they are and who they wish to become,

65   and in the process, develop a synthesised and coherent sense of identity (Arnett, 2000; Erikson, 1950).

66   Identity formation is key to psychosocial functioning, and to understand the dynamics of identity

67   development during emerging adulthood, we draw upon Crocetti et al.'s (2008) process-oriented

68   model. The three-factor model holds that emerging adults form, evaluate, and revise their identity

69   through three identity processes: commitment, in-depth exploration, and reconsideration of

70   commitment. *Commitment* refers to the choices that individuals make in identity-relevant domains and

71   the extent to which they identify with these choices; *in-depth exploration* is the extent to which

72   individuals reflect on, and seek further information about, their current commitments; whilst

73   *reconsideration of commitment* occurs when individuals compare their current commitments with

74   alternatives as their existing goals, values, and beliefs are no longer considered satisfactory (Crocetti

75   et al., 2010).

76   Research utilising the three-factor model has consistently evidenced how identity synthesis is

77   central to healthy adjustment and psychosocial functioning. For instance, commitment positively

78   associates with self-concept clarity, emotional stability, and strong peer and familial relationships

79   (Crocetti et al., 2010; Morsunbul et al., 2014), whilst reconsideration of commitment - which captures

80   a sense of uncertainty - has been found to associate with feelings of anxiety, depression, and poor

81   familial relationships (Crocetti et al., 2010; Hatano et al., 2016). More mixed results have been

82   reported regarding in-depth exploration, as whilst this process is characterised by intellectual curiosity

83   and a desire to learn, it can result in feelings of confusion and distress (Crocetti et al., 2008; Crocetti

84   et al., 2010). Studies utilising the three-factor model have also evidenced the progressive nature of

85   identity development across adolescence and emerging adulthood: as young people report

86   increasingly stable identity profiles, their tendency to explore commitments increases, whilst their

87   reconsideration typically decreases over time (Klimstra, Hale, et al., 2010). Furthermore, identity

88   maturation has been found to continue throughout emerging adulthood, and as emerging adults

89   progressively identify more strongly with their commitments, their commitments tend to become

90   more important for well-being as they occupy a more central role in self-definition (Luyckx et al.,

91   2013). In this sense, emerging adulthood is where young people increasingly develop a more solid

92   identity structure, and as emerging adults progressively make enduring decisions in important

93   identity-relevant domains, they become increasingly self-sufficient, engage in more mature

94   relationships, and assume more adult roles and responsibilities (Arnett, 2000).

95

96   ***Instagram and Identity Development***

97   The process of identity formation is embedded within one's social and historical context

98   (Crocetti, 2017), and for contemporary emerging adults, SNSs are important contexts for identity

99   development. One platform which is currently popular amongst British emerging adults is *Instagram*,

100   with around three quarters of those aged 16-24 (78%) in the UK having an Instagram account

101   (OFCOM, 2021). Instagram has also proven to be a highly engaging platform for British emerging

102   adults, with 24% of those aged 16-24 reporting that Instagram is their 'main' SNS (OFCOM, 2021),

103   whilst around two thirds (62%) of 15–34-year-olds visit the platform several times per day (Ipsos

104   MORI, 2020). Instagram is an image-sharing platform on which individuals typically share visual

105   content regarding themselves, their friends, and/or their day-to-day activities (Hu et al., 2014).

106   Notably, the platform contains in-built 'filters' or editing tools, and therefore invites its users to enrich

107   or modify their content before sharing it with their online communities. Whilst it is therefore

108   reasonable to assume that Instagram can support identity exploration through selective self-

109   presentation, young people spend considerably more time engaging with content posted by others on

110   Instagram than they do sharing content of their own (Frison & Eggermont, 2017). Limited scholarly

111   research has considered how other-focused SNS behaviours may influence identity development, and

112   as identity is informed through interactions with others within individuals' social networks (Crocetti,

113   2017), this significant gap in the literature warrants further study. To explore how engaging with

114   content shared by other Instagram users may inform the process of identity development during

115   emerging adulthood, we draw upon *social comparison theory*.

116

117   **Social Comparison Theory**

118   Social comparisons - comparisons between the self and others - are fundamental, ubiquitous,

119   and robust human proclivities which can have judgemental, affective, and behavioural consequences

120   (Corcoran et al., 2011). Although such behaviour can occur spontaneously or unconsciously, social

121   comparisons are often motivated by individuals' desire to evaluate, improve, or enhance the self.

122   Comparisons with others can therefore have important implications for self-knowledge and can guide

123   future behaviour. Following Festinger's (1954) original social comparison theory, researchers often

124   differentiate between social comparisons of ability (comparisons of performance or achievement) and

125   social comparisons of opinion (comparisons of beliefs and values). In this study, we focus on the

126   identity implications of social comparisons of ability on Instagram, as given the visual self-related

127   content that is typically shared on the platform, Instagram provides its users with abundant

128   opportunities to compare their lives, relationships, and achievements to those of others (Jiang &

129   Ngien 2020). Indeed, comparisons on Instagram are often conducted in key identity-related domains

130   such as education, romantic and peer relationships, and physical appearance (Midgley et al., 2020),

131   and research has consistently found that the more time emerging adults spend passively browsing

132   Instagram (e.g., Burnell et al., 2019) and the more intensely young people use Instagram (e.g.,

133   Stapleton et al., 2017), the more frequently they compare themselves to others on the platform.

134   Much of the social comparison literature focuses on the direction of ability comparisons, and

135   such processes are often framed in terms of upward and downward comparisons. Individuals conduct

136 *upward comparisons* with those they deem superior on a given dimension, with the superior other

137 typically acting as a role model who demonstrates how to improve the self (Wheeler, 1966). In

138 contrast, *downward comparisons* occur when individuals compare themselves with those they

139 consider inferior on a given dimension, and such comparisons are typically utilised to maintain a

140 positive self-image (Wills, 1981). Despite these typical motives for comparison, within the social

141 media literature, upward comparisons have been found to associate with both positive (e.g., Meier et

142 al., 2020) and negative outcomes (e.g., Vogel et al., 2014) for psycho-emotional wellbeing and self-

143 evaluation. Furthermore, although studied less frequently, research regarding downward comparisons

144 on SNSs has also reported inconsistent results (e.g., Rosenthal-von der Pütten et al., 2019; Steers et

145 al., 2014).

146   Notably, the consequences of upward/downward comparisons are determined by whether the

147 comparer assimilates or contrast themselves with the superior/inferior other (Suls et al., 2002).

148 Broadly speaking, assimilation refers to perceiving oneself as similar to the comparison target, whilst

149 contrast refers to perceiving oneself as different (Groothof et al., 2007). Several factors have been

150 found to influence the outcome of this assimilation vs. contrast dynamic, including individuals'

151 beliefs regarding their ability to become like the advantaged/disadvantaged other (Lockwood &

152 Kunda, 1997), and individuals' sense of self-mutability (Stapel & Koomen, 2000). These factors are

153 therefore important moderators that are likely to inform the implications of upward/downward

154 comparisons on Instagram. Given the progressive nature of identity and societal pressures to perform,

155 we propose that perceived attainability and self-mutability are likely to differ in accordance with age

156 during emerging adulthood. Thus, in the following sections, we first introduce the existing literature

157 regarding upward/downward comparisons on SNSs and identity development, and then discuss how

158 age may moderate the relationships between upward/downward comparisons on Instagram and the

159 three identity processes.

160

161 **Social Comparisons on Instagram and Identity Development**

162 *Upward Comparisons*

163   As Instagram users tend to strategically share positively biased self-related content on the

164 platform, upward comparisons with those who seemingly excel in various life domains are

165 commonplace (Schreurs & Vandenbosch, 2021). Young people often view the standards portrayed in

166 idealised Instagram content as unattainable (i.e., upward contrast) (Verduyn et al., 2020), and in

167 instances where emerging adults believe that they are unlike - or unable to be like - superior others on

168 SNSs, upward comparisons can have negative consequences for well-being and self-evaluation (e.g.,

169 Liu et al., 2017; Vogel et al., 2014; Wang et al., 2017). Significantly, negative self-evaluations can

170 have detrimental implications for identity development by reducing commitment, disturbing

171 exploration, and increasing self-uncertainty (Harter, 1999; Hirschi, 2011). Unsurprisingly, then,

172 research concerning ability comparisons on SNSs (which are predominately upward in nature) has

173 consistently found that such behaviour associates with negative outcomes for identity development

174 during emerging adulthood (e.g., Yang, Holden, Carter & Webb, 2018). For instance, a study of

175 emerging adult SNS users in the US found that such comparisons positively associated with the

176 diffuse-avoidant identity style, which then predicted reduced identity clarity (Yang, Holden & Carter,

177 2018). Notably, the diffuse-avoidant identity style reflects a condition of identity uncertainty and

178 avoidance, and negatively associates with commitment and in-depth exploration, and positively

179 associates with reconsideration of commitment (Crocetti et al., 2009).

180   Yet, differential susceptibility factors can moderate the relations between media use and

181 media responses (Valkenburg & Peter, 2013a), and in this instance, we propose that developmental

182 factors may lead upward comparisons on Instagram to have different consequences for younger and

183 older emerging adults[1]. Indeed, younger emerging adults tend to be less committed to their identity,

184 identify less with their commitments, and experience less societal pressure to make choices and

185 perform in identity-related domains (Luyckx et al., 2013; Raiu et al., 2014). Therefore, as younger

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[1] As sub-stages (i.e., early, middle, and late) of emerging adulthood are not clearly defined (Syed, 2015), consistent with previous research investigating age differences during emerging adulthood (e.g., Peer & McAuslan, 2016), we avoided categorisation in this study. Instead, we considered those closer to their late teens as being younger emerging adults, and those closer to their mid-late twenties as being older emerging adults.

186 emerging adults are typically less certain about their choices and have more time to make

187 commitments and consider alternatives, they may experience an increased belief that change and

188 progression over time is possible. Thus, should 'possible-self' mindsets be triggered, upward

189 comparisons should lead to more assimilative responses (Blanton, 2001), and younger emerging

190 adults should display a greater tendency to believe that their own futures could be as bright as the

191 upward comparison targets (Lockwood & Kunda, 1997). This may, in turn, enhance younger

192 emerging adults' sense of self-evaluation and motivate them to learn more about how to better

193 themselves in identity-related domains.

194   Previous research regarding the identity implications of performance-related comparisons on

195 SNSs supports the idea that age could be an important moderating factor. For instance, research with

196 adolescent samples has found that such comparisons tend to associate with positive identity-related

197 outcomes (i.e., increased commitment and in-depth exploration) (e.g., Noon, 2020), whilst studies

198 with emerging adult samples have consistently reported negative outcomes (i.e., rumination and the

199 diffuse-avoidant identity style) (e.g., Yang, Holden, & Carter, 2018). Furthermore, one cross-sectional

200 study has tested the moderating effect of age with a sample of adolescent *and* emerging adult

201 participants (Noon et al., 2021), and age was found to moderate the concurrent relationships between

202 non-directional performance-related comparisons on Instagram and commitment and in-depth

203 exploration. Aligning with notions of developmental progression, comparisons positively associated

204 with commitment and in-depth exploration for adolescents, and negatively associated with

205 commitment for emerging adults. Results were therefore indicative of developmental differences in

206 the assimilation vs. contrast dynamic, whereby for younger participants, comparisons on Instagram

207 may evoke further motivation to learn more about future possibilities, and in the process, support the

208 strengthening of commitments. However, for older participants - who tend to believe they have less

209 scope for positive change over time and report fewer 'possible selves' (Cross & Markus, 1991;

210 Heckhausen & Krueger, 1993), results were more suggestive of contrastive processes resulting in

211 decreased self-certainty.

212   Whether these possible developmental differences exist within emerging adulthood (rather

213 than just between adolescence and emerging adulthood) is currently unclear, as is whether these

214   results regarding the moderating effects of age would replicate longitudinally. However, as identity is

215   an ongoing process, the factors which inform identity development should exert their influence over

216   time. As such, longitudinal evidence is required to enhance confidence in causal inference and shed

217   further light on whether age can indeed inform the identity implications of social comparisons on

218   Instagram. Thus, guided by the existing evidence, we predict the following longitudinal cleaved

219   moderations (i.e., statistically significant IV-DV relationships of opposing valence at different levels

220   of the moderator; Holbert & Park, 2010):

221

222   H1a: Age will moderate the relationship between upward comparisons on Instagram and

223   commitment two months later; the relationship will be negative for older emerging adults, and

224   positive for younger emerging adults.

225

226   H1b: Age will moderate the relationship between upward comparisons on Instagram and in-

227   depth exploration two months later; the relationship will be negative for older emerging adults, and

228   positive for younger emerging adults.

229

230   H1c: Age will moderate the relationship between upward comparisons on Instagram and

231   reconsideration of commitment; the relationship will be positive for older emerging adults, and

232   negative for younger emerging adults.

233

234   ***Downward Comparisons***

235   As content shared on Instagram typically has a strong positive skew, downward comparisons with

236   those deemed inferior are less likely to occur (Midgley et al., 2020). Perhaps because such behaviour

237   occurs less frequently, less research has been conducted regarding the implications of downward

238   comparisons on the platform, and to date, no research has examined how downward comparisons on

239   SNSs inform identity development. Nevertheless, as with upward comparisons, downward

240   comparisons on SNSs have been found to have both positive (e.g., increased self-esteem) and negative

241   (e.g., increased depressive symptoms) outcomes for emerging adults (Rosenthal-von der Pütten et al.,

242   2019; Steers et al., 2014; Vogel et al., 2014).

243   The consequences of downward comparisons are again dependent upon the assimilation vs.

244   contrast dynamic, and we predict temporal considerations may also moderate the identity implications

245   of such behaviour. Yet, with downward comparisons, one's ability to become more like the

246   comparison target is no longer advantageous: downward assimilative responses are deleterious, in that

247   downward comparison targets represent 'feared selves' rather than 'hoped-for selves' (Blanton, 2001).

248   Thus, younger emerging adults - with their increased uncertainty and scope for change over time -

249   may be more susceptible to believing that they themselves could suffer the same misfortune as

250   downward comparison targets. This can pose a threat to the self (Lockwood, 2002), and could

251   therefore result in more maladaptive implications for identity development during early emerging

252   adulthood (i.e., reduced commitment, inhibited in-depth exploration, and increased reconsideration of

253   commitment). However, a mature, clearly defined, and stable sense of self may potentiate more

254   positive contrastive responses. Thus, having made firm commitments and began progressing in valued

255   identity-related domains, older emerging adults are more likely to have enough self-knowledge to

256   recognise that such an inferior outcome is improbable. For older emerging adults, then, a downward

257   comparison may be more of a pleasing reminder of their own relative superiority (Lockwood, 2002),

258   which may help to validate their identity-related choices. This would also likely reduce older

259   emerging adults' desire to reconsider their commitments and may even potentiate further in-depth

260   exploration as they seek to further develop their superior performance in identity-related domains.

261   Guided by this reasoning, we predict the following cleaved moderation:

262

263   H2a: Age will moderate the relationship between downward comparisons on Instagram and

264   commitment two months later; the relationship will be positive for older emerging adults, and

265   negative for younger emerging adults.

266

267   H2b: Age will moderate the relationship between downward comparisons on Instagram and

268   in-depth exploration two months later; the relationship will be positive for older emerging adults, and

269   negative for younger emerging adults.

270

271   H2c: Age will moderate the relationship between downward comparisons on Instagram and

272   reconsideration of commitment two months later; the relationship will be negative for older emerging

273   adults, and positive for younger emerging adults.

274

275   ***Bi-directional Relationships***

276   Whilst we predict that upward and downward comparisons on Instagram may have

277   implications for identity development during emerging adulthood, a reverse relationship whereby

278   emerging adults' identity processes inform social comparison behaviour on Instagram may also exist.

279   Indeed, upward and downward comparisons are particularly commonplace amongst individuals who

280   experience self-uncertainty and high intolerance of uncertainty (Butzer & Kuiper, 2006). Studies have

281   found similar results regarding online behaviour, with emerging adults scoring high in self-uncertainty

282   reporting the highest scores in comparison behaviour on Facebook (Lee, 2014). As individuals who

283   experience self-certainty also report high identity commitment (Crocetti et al., 2008), we predict that

284   emerging adults with low commitment may be more likely to compare themselves to others on

285   Instagram. Specifically, as such individuals often seek information from others - irrespective of their

286   perceived similarity - to support uncertainty reduction (Michinov & Michinov, 2001), we predict that

287   those with low commitment will report higher levels of both upward and downward comparisons on

288   Instagram. We therefore propose the following hypotheses:

289

290   H3a: Commitment will negatively associate with upward comparisons on Instagram two

291   months later

292

293   H3b: Commitment will negatively associate with downward comparisons on Instagram two

294   months later

295

296   Furthermore, exploratory processes may also predict comparison behaviour on Instagram.

297 Whilst there are many ways in which young people can explore their identity, social comparisons can

298 be a useful means of evaluating current commitments (i.e., in-depth exploration) and reflecting on the

299 merits of alternatives (i.e., reconsideration of commitment). In this sense, emerging adults may

300 actively seek out comparisons with others to help make identity-related decisions (Albarello et al.,

301 2018). Guided by this reasoning, we predict that emerging adults who are actively exploring their

302 identity will report higher levels of upward and downward comparisons on Instagram. We therefore

303 hypothesise:

304

305   H3c: In-depth exploration will positively associate with upward comparisons on Instagram

306 two months later

307

308   H3d: In-depth exploration will positively associate with downward comparisons on Instagram

309 two months later

310

311   H3e: Reconsideration of commitment will positively associate with upward comparisons on

312 Instagram two months later

313

314   H3f: Reconsideration of commitment will positively associate with downward comparisons

315 on Instagram two months later

316

317   **Method**

318 **Participants and Procedure**

319   To explore the hypothesised reciprocal causal relationship between social comparisons on

320 Instagram and identity development, a two-wave longitudinal study was conducted. Three hundred

321 and twenty-seven British emerging adult (M age = 22.12, SD = 2.28; Female = 74.31%; White British

322 = 74.01%) Instagram users responded to an initial online survey distributed on Facebook and Twitter

323 between February and March 2020 (W1). The only inclusion requirements were that respondents were

324 aged 18-29 years, were regular Instagram users, and were still in full-time education. No incentives

325 were offered to prospective participants, and prior to W1, ethical approval was obtained from the

326 [BLINDED] Research Ethics Committee. Respondents were subsequently invited to participate in a

327 follow-up survey (W2) two months from the date they completed their initial survey. All W2 surveys

328 were therefore completed during a period of COVID-19 lockdown in the UK. Although a two-month

329 interval is relatively short for those studying identity development longitudinally, identity is dynamic

330 and often emerges through short-term micro-level exploratory processes (Becht et al., 2021).

331 Furthermore, longitudinal research using a two-month lag has previously evidenced significant media

332 effects amongst emerging adult samples (e.g., Barlett & Gentile, 2012; Mittall et al., 2013; van Oosten

333 & Vandenbosch, 2020). Thus, as Instagram use was part of the daily lives of respondents -

334 particularly during the COVID-19 pandemic which saw increased social media use during emerging

335 adulthood (Lisita et al., 2020), a two-month interval was considered long enough to assess changes in

336 identity processes and social comparison behaviours, whilst being short-enough to protect against

337 high attrition.

338   Two hundred and seventeen emerging adults participated in both waves of data collection,

339 indicating a retention rate of 66.36%. Attrition of 120 participants was not related to age (t(182.89) =

340 0.34, p = .73) or gender ($\chi2$(1) = 1.61, p = .20), but ethnicity differences were identified, with non-

341 White British participants being more likely to only complete the W1 survey ($\chi2$(1) = 5.03, p = .03).

342 Independent samples t-tests reported no significant differences in mean scores for focal variables

343 between those who completed both surveys and those who completed just the W1 survey (ps = .09 to

344 .77), except for scores regarding reconsideration of commitment (t(191.50) = 4.00, p < .001).

345 Respondents who only completed W1 surveys reported higher scores for reconsideration of

346 commitment. Of the 217 participants who participated in both surveys, six were removed from the

347 study due to significant missing data for dependent variables (Hair et al., 2014). Twenty-one of the

348 remaining cases (9.95%) reported a small amount of missing data (0.53% of all values), and Little's

349 missing completely at random (MCAR) test indicated that missing data were MCAR ($\chi2(1606) =$

350 1638.29, $p = .28$). To detect a medium effect (.03) within the hypothesised model, a sample size of

351 208 was required ($\alpha = 0.05$, power = .80) (Soper, 2022). Thus, to preserve statistical power and

352 provide a complete dataset from which parcels and interaction terms could be computed, a single

353 imputation using the expectation maximation algorithm was applied. The final sample therefore

354 consisted of 211 British emerging adults (W1: M age = 22.09, SD = 2.09; Female = 76.78%; White

355 British = 78.20%).

356

Measures

357

358 The survey contained questions regarding age, gender, and ethnicity, along with Likert-scale

359 multi-item questions which measured upward and downward comparisons on Instagram and identity

360 processes. Additional data regarding the amount or intensity of Instagram use were not collected, as

361 self-report media exposure measures are often inaccurate (Valkenburg & Peter, 2013b). Furthermore,

362 whilst such variables typically relate to social comparison frequency, previous research has evidenced

363 that frequency of social media use does not have a significant effect on identity (e.g., Yang, Holden &

364 Carter, 2017) or self-esteem (e.g., Vogel et al., 2014) above and beyond social comparison

365 behaviours.

Upward and Downward Comparisons on Instagram

366

367 Eight items from an upward and downward social comparison scale (Gibbons & Buunk,

368 1998) were adapted to measure social comparison behaviour on Instagram. We added "When using

369 Instagram…" to the beginning of each item and, when required, restructured item wording to ensure

370 coherency. Participants indicated the extent to which each item applied to them on a 5-point Likert

371 scale (1 = Not at all, 5 = Very well). Four items measured upward comparisons on Instagram (e.g.,

372 "When using Instagram, I compare myself with others who have better personal lives than I do") and

373 four items measured downward comparisons on the platform (e.g., "When using Instagram, I compare

374 myself with others who have worse personal lives than I do"). Confirmatory factor analyses

375   confirmed a two-factor structure (W1: χ^2/df = 1.73, CFI =.99, TLI = .99, RMSEA = .06; W2: χ^2/df =

376   2.01, CFI = .99, TLI = .98, RMSEA = .07), and both upward (W1: α = .92; W2: α = .93) and

377   downward comparison (W1: α = .93; W2: α = .94) sub-scales reported high internal consistency. The

378   items used and full factor-loadings are presented below in Table 1.

379

380   [Place Table 1 Here]

381

382   ***Identity Processes***

383   To measure identity processes, we utilised a short-form version of the Utrecht-Management

384   of Identity Commitments Scale (U-MICS; Schubach et al., 2017). The short-form version of U-MICS

385   contains nine items on a five-point Likert scale (1 = Completely untrue, 5 = Completely true): three

386   items concern commitment (e.g., "My education gives me self-confidence"), three assess in-depth

387   exploration (e.g., "I often reflect on my education"), and three measure reconsideration of

388   commitment (e.g., "I often think that a different education would make my life more interesting").

389   Although U-MICS can be used to study identity in terms of specific ideological or relational domains,

390   global identity scores are often generated through combining scores from at least one ideological and

391   one relational domain (e.g., Crocetti et al., 2010; Dimitrova et al., 2015; Vosylis et al. 2017). In this

392   study, a global approach to identity was adopted to ensure theoretical consistency with the domain-

393   independent scale used to measure upward and downward comparisons on Instagram. Global identity

394   processes were discerned through combining scores from two ideological (i.e., education and politics)

395   and two relational (i.e., peer relationships and romantic relationships) domains. As measures for four

396   domains were utilised, there were a total of 36 items. Confirmatory factor analyses using random

397   parcelling confirmed the three-factor structure of the global identity processes (W1: χ^2/df = 1.87, CFI

398   =.99, TLI = .98, RMSEA = .06; W2: χ^2/df = 1.58, CFI = .99, TLI = .99, RMSEA = .05). Furthermore,

399   global commitment (W1: α = .69; W2: α = .73), in-depth exploration (W1: α = .70; W2: α = .72), and

400   reconsideration of commitment (W1: α = .81; W2: α = .81) all reported acceptable internal

401   consistency.

402

403   **Results**

404   **Exploratory Analysis**

405   For descriptive purposes, mean scores for focal variables were generated, and zero-order

406   correlations were computed (Table 2). Respondents reported more upward (W1: $M = 3.09$, $SD = 1.16$;

407   W2: $M = 3.00$, $SD = 1.21$) than downward comparisons (W1: $M = 1.96$, $SD = 1.01$; W2: $M = 1.86$, $SD

408    $= 0.95$) on Instagram during both waves of data collection (W1: $t(210) = 14.84$, $p < .001$; W2: $t(210)$

409    $= 13.05$, $p < .001$). In terms of concurrent correlations between social comparisons on Instagram and

410   identity processes, upward comparisons positively correlated with reconsideration of commitment

411   during both waves (W1: $r = .22$, $p = .001$; W2: $r = .17$, $p = .02$), and in-depth exploration during W1

412   ($r = .15$, $p = .03$). In contrast, downward comparisons positively correlated with reconsideration of

413   commitment during both waves (W1: $r = .26$, $p < .001$; W2: $r = .23$, $p = .001$).

414

415   [Place Table 2 Here]

416

417   **Testing the Hypothesised Model**

418   *Analytic Strategy*

419   To examine the reciprocal relationships between social comparison behaviour on Instagram

420   and identity processes, study hypotheses were tested using a cross-lagged panel model on AMOS.

421   Cross-lagged models enable researchers to investigate temporal precedence, and by fitting

422   autoregressive paths between dependent variables across time points, stronger causal inference can be

423   made (Falkenstrom et al., 2020).

424 All focal variables (i.e., upward comparisons, downward comparisons, commitment, in-depth

425 exploration, and reconsideration of commitment) were treated as latent variables. To enhance model

426 parsimony, reduce random error, and increase model fit (Matsunaga, 2008), parcels were used as

427 manifest indicators of latent identity process variables (W1 and W2). Consistent with previous studies

428 employing U-MICS (e.g., Crocetti et al., 2008), parcels were computed randomly, and three parcels -

429 each containing four items (i.e., one item per domain) - were computed for each identity process.

430 Latent variable interaction terms (e.g., upward comparison x age, downward comparison x age; W1)

431 were computed using the double-mean-centering approach, whereby observed variables were centered

432 before product terms were computed and centered again (Lin et al., 2010).

433 In addition to the hypothesised paths, direct paths were modelled between all focal variables

434 across both time points. Age (18-27), gender (Male = 0; Female = 1), and ethnicity (White British = 0;

435 Non-White British = 1) (W1) were also entered as control variables for predicting all dependent

436 variables (W2). Furthermore, as previous research has identified gender differences in terms of the

437 implications of social comparisons on SNSs (e.g., Noon, 2020), we controlled for this effect by

438 modelling paths between upward comparisons x gender and downward comparisons x gender (W1)

439 and the three identity processes (W2). Finally, covariances were estimated between all independent

440 variables, between the residual variances of the dependent variables, and between the error terms of

441 the same items/parcels across both waves. Model fit was considered acceptable when $\chi^2/df \leq 3.00$

442 (Schermelleh-Engel et al., 2003), CFI and TLI were $\geq .90$, and RMSEA was $\leq .08$ (Byrne, 2010).

443

444 ***Results***

445 The hypothesised model reported an acceptable fit ($\chi2/df = 1.54$, CFI =.94, TLI = .93,

446 RMSEA = .05). Parameter estimates for all direct paths of interest, hypothesised paths, and significant

447 control paths can be found in Table 3. Neither upward nor downward comparisons on Instagram (W1)

448 predicted any of the three identity processes (W2). In terms of the moderating effects of age, age

449 significantly moderated the relationship between upward comparisons on Instagram (W1) and

450   commitment (W2). The simple slopes were therefore inspected at different levels of age (-1 SD =

451   younger emerging adults, +1 SD = older emerging adults): the relationship was negative for older

452   emerging adults (b = -.10, p = .02), but not significant for younger emerging adults (b = .05, p = .36).

453   H1a was therefore partially supported. Age did not significantly moderate the relationships between

454   upward comparisons on Instagram (W1) and in-depth exploration (W2) or reconsideration of

455   commitment (W2). Thus, H1b and H1c were not supported.

456   Age significantly moderated the relationship between downward comparisons on Instagram

457   (W1) and commitment (W2): the relationship was negative for younger emerging adults (b = -.14, p =

458   .03), but not significant for older emerging adults (b = .06, p = .26). H2a was therefore partially

459   supported. Furthermore, age did not significantly moderate the relationships between downward

460   comparisons on Instagram (W1) and in-depth exploration (W2) or reconsideration of commitment

461   (W2). H2b and H2c were therefore not supported.

462   In terms of the reverse paths, none of the three identity processes (W1) predicted either

463   upward or downward comparisons on Instagram (W2). H3a, H3b, H3c, H3d, H3e, and H3f were

464   therefore not supported.

465

466   [Place Table 3 Here]

467

468   **Discussion**

469   Guided by the developmental and social psychological literatures, this study examined

470   whether age moderated the longitudinal relationships between upward and downward comparisons on

471   Instagram and three identity processes during emerging adulthood. As expected, there was no direct

472   longitudinal relationship between upward and downward comparisons on Instagram and the three

473   identity processes. Age was found to moderate the longitudinal relationships between upward and

474   downward comparisons on Instagram and commitment, but significant age differences were not found

475   when predicting in-depth exploration or reconsideration of commitment. We also tested whether

476   identity processes longitudinally predicted upward and downward comparisons on Instagram, though

477   significant results were not found. Below, we discuss these results in more detail.

478   As predicted, age was found to moderate the relationship between upward comparisons on

479   Instagram and commitment (H1a). For older emerging adults, upward comparisons negatively

480   predicted commitment two months later. These results suggest that due to the progressive nature of

481   identity development and societal pressures to perform, older emerging adults may be more at risk of

482   experiencing increased feelings of pressure and inadequacy following comparisons with superior

483   others on Instagram, and this may lead them to doubt important aspects of their identity. Age also

484   moderated the relationship between downward comparisons on Instagram and commitment (H2a),

485   and downward comparisons negatively predicted commitment two months later for younger emerging

486   adults. This suggests that given their less mature identity profiles and greater scope for change over

487   time, younger emerging adults may find inferior others to be more self-threatening. Indeed, it is

488   possible that younger emerging adults are more prone to believing they will suffer the same

489   misfortune as downward comparison targets, which may in turn reduce their sense of self-certainty.

490   These results provide evidence of the negative implications that upward/downward comparisons may

491   have on emerging adults' sense of commitment. Furthermore, the effect of age on the direction of

492   comparison which negatively associated with commitment was consistent with our assumptions

493   regarding developmental differences in the assimilation vs. contrast dynamic.

494   Guided by this reasoning, we also hypothesised that upward comparisons on Instagram would

495   positively predict commitment for younger emerging adults (H1a), and downward comparisons on

496   Instagram would positively predict commitment for older emerging adults (H1b). Whilst the

497   directions of the relationships were consistent with our hypotheses, neither were significant at the $p <$

498   .05 level. Thus, although we predicted a cleaved moderation, the analysis only provided evidence of a

499   contingent moderation, whereby only negative longitudinal relationships between upward/downward

500   comparisons on Instagram and commitment were found. These exclusively negative associations may

501   be resultant of the instability and uncertainty associated with emerging adulthood. Indeed, individuals

502   report more negatively valanced comparisons in times of uncertainty, as uncertainty can enhance

503   feelings of strain, which can increase vigilance to the negative information inherent in social

504   comparisons (Buunk et al., 1990). These results should also be interpreted against the backdrop of the

505   COVID-19 lockdown that was observed during W2 of data collection, wherein increased uncertainty

506   and insecurity were experienced by many emerging adults (Germani et al., 2020), thus potentiating an

507   even greater focus on the negative aspects of social comparisons. Furthermore, reduced autonomy and

508   self-directedness were common experiences amongst young people during COVID-19 lockdowns

509   (Fioretti et al., 2020), and low perceived control over one's relative status has also been found to

510   increase the likelihood of negative comparisons (i.e., upward contrast and downward assimilation)

511   (Smith, 2000). Thus, whilst it is reasonable to assume that emerging adults did engage with Instagram

512   content that could have positive consequences for identity formation during the period of this study,

513   respondents may have experienced an elevated tendency to interpret Instagram content as self-

514   threatening. It would therefore be prudent for future research to replicate this study to help determine

515   whether differing social conditions may potentiate more positive comparisons (i.e., upward

516   assimilation and downward contrast) amongst emerging adult Instagram users.

517   We also hypothesised that age would moderate the longitudinal associations between upward

518   and downward comparisons on Instagram and the two exploratory processes (i.e., in-depth exploration

519   and reconsideration of commitment). However, no significant moderator effects were found (H1b,

520   H1c, H2b, H2c). Because the longitudinal direct relationships between upward and downward

521   comparisons on Instagram and the exploratory processes were also not significant, findings provide

522   no longitudinal evidence to suggest that such behaviour prompts emerging adults to explore their

523   identity. Methodological factors may help to explain these non-significant results. There was a two-

524   month interval between waves of data collection, and whilst this is not a particularly long period for

525   those researching identity development longitudinally, identity is dynamic and often emerges through

526   short-term micro-level exploratory processes (Becht et al., 2021). Thus, it may be that the exploratory

527   implications of upward and downward comparisons on Instagram are less detectable in more long-

528   term longitudinal studies. Indeed, whilst causal inference cannot be made, positive concurrent

529   correlations were found between upward and downward comparisons and the exploratory processes

530   during both waves of data collection, which could be suggestive of social comparisons having short-

531   term effects on identity exploration. As exploratory behaviour predicts identity commitment over time

532   (Klimstra, Luyckx, et al., 2010), this short-term exploration may have prompted the longitudinal

533   changes in commitment detected in this study.

534   However, the significant concurrent correlations at both time points may also be reflective of

535   the reverse relations (i.e., the momentary effects of identity processes on social comparison behaviour

536   on Instagram). Indeed, in-depth exploration positively correlated with upward comparisons on

537   Instagram during W1, and this may suggest that emerging adults compare themselves with superior

538   others on Instagram to help learn more about how to better themselves in identity-related domains.

539   Reconsideration of commitment concurrently associated with upward and downward comparisons on

540   Instagram during both waves of data collection, and because social comparison behaviour typically

541   increases during times of uncertainty (Gibbons & Buunk, 1999), it is possible that these correlations

542   reflect the fact that emerging adults engage in social comparison behaviour on Instagram to help

543   overcome their identity confusion. Whilst we tested whether identity processes would predict social

544   comparison behaviours on Instagram two months later (H3a, H3b, H3c, H3d, H3e, and H3f) to shed

545   further light on these concurrent correlations, no significant results were found. Thus, as social

546   comparisons can occur quickly and are often triggered by individuals' current self-related motives

547   (Arigo et al., 2020), these results further emphasise the importance of conducting more short-term

548   longitudinal research (e.g., experience sampling and/or daily diaries) to help determine temporal

549   sequence.

Limitations and Future Research

551   Whilst this study provided important insight into how age may moderate the identity

552   implications of social comparisons on Instagram during emerging adulthood, it comes with limitations

553   which ought to be addressed in future research. In terms of methodology, as previously outlined,

554   shorter-term longitudinal designs may provide more nuanced insights into the dynamic bi-directional

555   relationship between social comparisons on Instagram and identity development. Furthermore, having

556   only collected data over two time points, we were unable to distinguish within-person from between-

557   person variance, and given the number of paths in our model, our sample size ($N = 211$) was relatively

558   small. Larger samples and additional waves of data collection may provide more reliable results.

559   Finally, in this study, we only collected data from emerging adults in full-time education. Whilst this

560   was to ensure that the domains in which identity-related data were collected (i.e., education, politics,

561   peer relationships, and romantic relationships) were salient in the lives of all participants, it is

562   important to recognise that results may not replicate amongst emerging adults in full-time

563   employment.

564   As with all previous studies exploring the identity implications of social comparisons on

565   SNSs, this investigation utilised domain-independent approaches to both social comparison behaviour

566   and identity development. However, certain self-related domains are more prominent and/or idealised

567   on Instagram (e.g., romantic relationships and physical appearance), and it is possible that social

568   comparisons in these domains may have greater consequences for identity formation. As the

569   relationship between global and domain-specific identity is often modest (Goossens, 2001), future

570   research should examine how different aspects of identity are shaped by domain-specific social

571   comparisons on Instagram (e.g., how comparisons related to educational achievement inform

572   educational identity). It was not possible to align identity domain and social comparison behaviour in

573   this study due the domain-independent nature of the scale used to measure social comparison

574   behaviour on Instagram.

575   Further research should also consider *who* emerging adults are comparing themselves to on

576   Instagram. Indeed, comparisons with strangers (e.g., Chou & Edge, 2012) and those perceived as

577   dissimilar to the self (e.g., Noon & Meier, 2019) on Instagram are more likely to have negative

578   psycho-emotional consequences for young people, and it is therefore reasonable to assume that certain

579   comparison targets tend to have more maladaptive implications for identity development. It would

580   also be fruitful for researchers to consider the impact that social comparison motive (e.g., self-

581   enhancement, self-evaluation, and self-improvement) may have on how social comparisons on

582 Instagram inform identity development, as initial evidence suggests that opposing comparison

583 motives can produce differing affective responses amongst emerging adults (Cramer et al., 2016).

584 Finally, whilst this investigation shed light on how age may moderate the outcomes of social

585 comparisons on Instagram, less is known about the drivers of social comparison behaviour on the

586 platform. We predicted that identity processes may guide social comparison behaviour on Instagram,

587 and although concurrent correlations suggested that there may be short-term effects, no longitudinal

588 relationships were found. Given that evidence is accumulating which suggests that such behaviour can

589 have negative implications for identity development and well-being during emerging adulthood,

590 future research could consider the drivers of social comparisons on Instagram. Research may also

591 consider more person-centered analyses to explore individual patterns in both upward and downward

592 social comparison tendencies. By having a more nuanced understanding of what leads emerging

593 adults to engage in potentially 'risky' social comparison behaviours, and how individuals differ in

594 specific social comparison patterns, we will be better placed to support young people to successfully

595 navigate the platform.

596

597 **Conclusion**

598 This investigation explored whether age moderated the longitudinal relationship between

599 upward and downward comparisons on Instagram and identity processes during emerging adulthood.

600 Whilst many of the hypothesised paths were not significant, age differences were found regarding

601 how upward and downward comparisons on Instagram predicted commitment two months later:

602 upward comparisons negatively associated with commitment for older emerging adults, and

603 downward comparisons negatively associated with commitment for younger emerging adults. Results

604 provide support for the notion that developmental factors may inform the identity implications of

605 social comparison behaviour on Instagram, and therefore have important consequences for those

606 supporting young people. Specifically, given emerging adults' differential susceptibility to media

607 effects, a 'one-size-fits-all' approach to support is unlikely to provide the desired outcome. Rather,

608   when attempting to support emerging adults to navigate Instagram in a way that is beneficial for

609   identity formation, developmental sensitivity is required, and consideration should be given to the

610   maturation of individual emerging adult Instagram users before providing guidance.

611

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861 Table 1. The Upward and Downward Social Comparisons on Instagram scale (UDSCI)

	Factor Loadings	
	W1	W2
Upward Comparison		
When using Instagram, I compare myself with others who have better personal lives than I do	.89	.84
When using Instagram, I compare myself with others who are more socially skilled (e.g., more popular) than I am	.86	.78
When using Instagram, I compare myself with others performing better (e.g., at home, work, school, or wherever) than I am	.84	.92
When using Instagram, I compare myself with others who have accomplished more in life than I have	.87	.91
Downward Comparison		
When using Instagram, I compare myself with others who have worse personal lives than I do	.83	.85
When using Instagram, I compare myself with others who are less socially skilled (e.g., less popular) than I am	.83	.82
When using Instagram, I compare myself with others performing worse (e.g., at home, work, schools, or wherever) than I am	.92	.95
When using Instagram, I compare myself with others who have accomplished less in life than I have	.93	.96

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Table 2. Means, Standard Deviations, and Zero-Order Correlations for Focal Variables

	M (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Upward SC W1	3.09 (1.16)	1												
2. Downward SC W1	1.96 (1.01)	.49***	1											
3. Commitment W1	3.26 (0.56)	.10	.14*	1										
4. Exploration W1	3.41 (0.60)	.15*	.06	.73***	1									
5. Reconsideration W1	2.00 (0.61)	.22***	.26***	-.15*	-.05	1								
6. Age W1	22.09 (2.09)	.02	-.002	.09	.14*	-.01	1							
7. Upward SC W2	3.00 (1.21)	.69***	.41***	.03	.07	.22**	-.14	1						
8. Downward SC W2	1.86 (0.95)	.21**	.56***	.11	.06	.20**	-.01	.34***	1					
9. Commitment W2	3.15 (0.59)	-.06	.002	.68***	.50***	-.23**	.04	-.05	.10	1				
10. Exploration W2	3.38 (0.63)	.08	-.01	.58***	.69***	-.12	-.004	.08	.12	.68***	1			
11. Reconsideration W2	2.03 (0.60)	.17*	.23**	-.20**	-.14*	.65***	-.03	.14*	.21**	-.23**	-.15*	1		
12. Age W2	22.26 (2.11)	< .001	-.01	.10	.13	-.03	.98***	-.15*	-.01	.04	-.002	-.03	1	
13. Gender	-	.13	-.09	.10	.10	-.18**	-.05	.12	-.16*	.11	.09	-.10	-.03	1

Note. Based on $N = 211$ participants and two-tailed significance tests. M = mean, SD = standard deviation, SC = social comparison. *$p <.05$, **$p <.01$, ***$p <.001$. Gender was coded Male = 0, Female = 1.

Table 3. Estimates for Direct Paths of Interest, Hypothesised Paths, and Significant Control Paths

	b	SE	β	p
Direct Paths of Interest				
W1 Upward SC → W2 Commitment	-.03	.03	-.05	.43
W1 Upward SC → W2 Exploration	.03	.04	.07	.34
W1 Upward SC → W2 Reconsideration	.001	.04	.003	.97
W1 Downward SC → W2 Commitment	-.04	.04	-.08	.25
W1 Downward SC → W2 Exploration	-.05	.04	-.09	.19
W1 Downward SC → W2 Reconsideration	.04	.04	.07	.33
Hypothesised Paths				
W1 Upward SC x Age → W2 Commitment	-.04*	.01	-.16	.01
W1 Upward SC x Age → W2 Exploration	-.03	.02	-.11	.08
W1 Upward SC x Age → W2 Reconsideration	-.003	.02	-.01	.84
W1 Downward SC x Age → W2 Commitment	.05**	.02	.17	.009
W1 Downward SC x Age → W2 Exploration	.04	.02	.11	.10
W1 Downward SC x Age → W2 Reconsideration	-.01	.02	-.02	.80
W1 Commitment → W2 Upward SC	-.16	.23	-.07	.50
W1 Commitment → W2 Downward SC	.08	.19	.05	.69
W1 Exploration → W2 Upward SC	.04	.22	.02	.86
W1 Exploration → W2 Downward SC	.02	.19	.01	.91
W1 Reconsideration → W2 Upward SC	.13	.12	.07	.30
W1 Reconsideration → W2 Downward SC	.06	.10	.04	.58
Significant Control Paths				
W1 Age → W2 Upward SC	-.10**	.03	-.17	.001
W1 Age → W2 Exploration	-.03*	.02	-.11	.04
W1 Upward SC → W2 Upward SC	.69***	.08	.66	<.001
W1 Downward SC → W2 Downward SC	.50***	.07	.61	<.001
W1 Commitment → W2 Commitment	.73***	.11	.72	<.001
W1 Exploration → W2 Exploration	.69***	.12	.65	<.001
W1 Reconsideration → W2 Reconsideration	.70***	.07	.68	<.001

Note. Based on $N = 211$ participants and two-tailed significance tests. SC = social comparison. *p <.05, **p <.01, ***p <.001.