

Extraversion, Social Interactions, and Well-Being During the COVID-19 Pandemic:**Did Extraverts Really Suffer More Than Introverts?**

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33 We embrace the values of openness and transparency in science (Schönbrodt et al., 2015). We
34 report how we determined our sample size, all data exclusions (if any), all manipulations, and all
35 measures in the study (Simmons et al., 2012), or refer to project documentations in the OSF. The data
36 and statistical code necessary to reproduce the reported results can be retrieved from
37 <https://osf.io/y726z/>. The studies' data cleaning procedures, hypotheses, and statistical analyses were
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Abstract

A large body of research suggests that extraversion is positively related to well-being. However, it is unclear whether this association can be explained by social participation (i.e., more extraverted individuals engage in social interactions more frequently) or social reactivity (i.e., more extraverted individuals profit more from social interactions) processes. Here, we examined the role of social interactions for the extraversion–well-being relationship during the COVID-19 pandemic, an unprecedented time of reduced social contact. We analyzed data from an international, longitudinal study (Study 1: 10,523 assessments provided by 4,622 participants) and two experience sampling studies (Study 2: 29,536 assessments provided by 293 participants; Study 3: 61,492 assessments provided by 1,381 participants). Preregistered multilevel structural equation models revealed that extraversion was robustly related to well-being, even when social restrictions were in place. Across data sets, we found some support for the social participation hypothesis (i.e., the relationship between extraversion and well-being is mediated by social interactions), but the social reactivity hypothesis (i.e., extraversion moderates the relationship between social interactions and well-being) was not consistently supported. Strikingly, however, exploratory analyses showed that the social reactivity hypothesis was supported for specific facets of extraversion (i.e., sociability) and well-being (i.e., activated positive affect). Moreover, changes in social interaction patterns during the COVID-19 pandemic (e.g., decreases in face-to-face interactions and interactions with friends) were unrelated to extraversion, and more extraverted individuals did not suffer more from these changes. Taken together, these findings underline the robustness of the effects of extraversion on well-being during a societal crisis.

Keywords: extraversion, well-being, social interactions, experience sampling, COVID-19

71 **Extraversion, Social Interactions, and Well-Being During the COVID-19 Pandemic:**
72 **Did Extraverts Really Suffer More Than Introverts?**

73 Decades of research have shown that extraversion is positively related to well-being (Anglim et
74 al., 2020), but the underlying processes remain unclear. One key domain of processes that could
75 explain the link between extraversion and well-being is the domain of social interactions (Lucas et al.,
76 2008). Specifically, it has been hypothesized that more extraverted individuals may be happier because
77 they interact more on average (social participation), because they enjoy social interactions more (social
78 reactivity), or both.

79 Recently, the COVID-19 pandemic fundamentally changed people's social lives. To reduce the
80 spread of the virus, individuals all around the world were encouraged to physically distance themselves
81 from others (Hale et al., 2021). Physical distancing provides a unique opportunity to investigate how
82 involuntary reductions in the frequency of social interactions affect the well-being of more extraverted
83 individuals. In particular, it is a widespread conviction amongst laypeople that individuals high in
84 extraversion suffered more from social restrictions in terms of decreased well-being:

85 *Introverts, please put down your book and check on your extrovert friends. They are not okay.*

86 (<https://twitter.com/vicking02/status/1240059003465498624/photo/1>)

87 This phenomenon could be a result of both social participation and social reactivity processes: More
88 extraverted individuals may have suffered more because they experienced stronger decreases in social
89 participation, because they reacted more negatively to these decreases, or both.

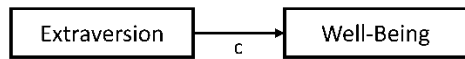
90 Although these hypotheses may seem plausible, previous studies on this issue have yielded
91 mixed results. For example, Entringer and Gosling (2022) reported that more extraverted individuals
92 experienced stronger increases in loneliness during the pandemic, whereas Folk et al. (2020) found that
93 changes in social connectedness were unrelated to extraversion. Thus, it is currently unknown whether

94 individuals high in extraversion suffered more from social restrictions and to what extent this effect can
95 be explained by social participation, social reactivity, or both processes.

96 With this research, we aimed to examine the links between extraversion, social interactions, and
97 well-being across three longitudinal studies, which were conducted before, during, and after the first
98 COVID-19-related lockdown in 2020. We used the COVID-19 pandemic as a natural quasi-
99 experimental setting to examine how more extraverted individuals reacted to decreases (beginning of
100 physical distancing regulations) and increases (end of physical distancing regulations) in their
101 opportunities to engage in social interactions. Our study extends previous research in two additional
102 ways. First, we zoomed in on the social situation and compared the effects of different types of social
103 interactions (e.g., face-to-face vs. computer-mediated interactions, interactions with friends vs. family).
104 Second, we zoomed in on the person by examining the effects of three extraversion facets (i.e.,
105 sociability, assertiveness, and energy level). Previous research has shown that the relationship between
106 extraversion and well-being likely depends on the specific extraversion facet that is being examined
107 (Margolis et al., 2020), but little research has targeted the underlying mechanisms.

108 **Effects of Extraversion**

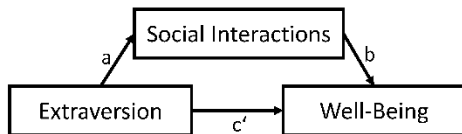
109 Extraversion is a broad trait domain that subsumes tendencies toward sociability, assertiveness,
110 warmth, positive emotions, activity level, and excitement seeking (Costa & McCrae, 1995; Soto &
111 John, 2017). A large body of research has shown that extraversion is positively related to well-being
112 (Figure 1a; Anglim et al., 2020; Costa & McCrae, 1980; Soto, 2019; Steel et al., 2008), which includes
113 multiple dimensions, such as affective (e.g., positive and negative affect) and cognitive aspects (e.g.,
114 life satisfaction; Diener, 1984). Regarding affective aspects, previous research has shown that
115 extraversion is more strongly correlated with activated positive affect (e.g., enthusiastic, excited) than
116 with merely pleasant affect (e.g., happy, pleased; Smillie, DeYoung, et al., 2015).

117 **Figure 1**118 *Models Concerning the Effects of Extraversion*

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120 (a) Model 1: Main Effect on Well-Being

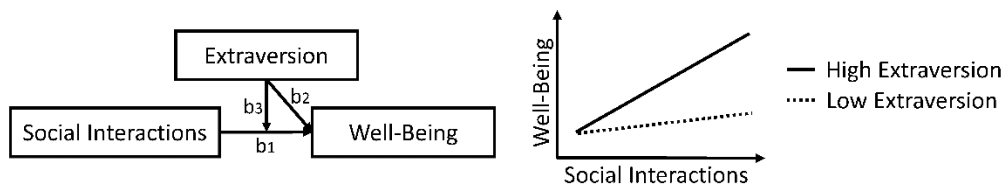
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123 (b) Model 2: Social Participation

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126 (c) Model 3: Social Reactivity

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129 However, the explanation for the extraversion–well-being relationship is unclear. Initially, it
 130 was suggested that the association may be due to conceptual and methodological overlap because the
 131 definition and measures of extraversion include aspects of well-being (e.g., positive affect). Indeed,
 132 previous research has shown that extraversion facets, such as positive emotions (NEO), social self-
 133 esteem and liveliness (HEXACO), or energy level (BFI-2)—which are very similar to well-being
 134 scales—are the strongest correlates of well-being (Anglim et al., 2020; Margolis et al., 2020).
 135 However, conceptual or methodological overlap cannot fully account for the relationship between
 136 extraversion and well-being, as the relationship holds across different measures of extraversion with
 137 varying affective content (Lucas & Fujita, 2000). Therefore, research has searched for additional
 138 explanations for the extraversion–well-being relationship.

139 One set of explanations focuses on biological differences that might characterize more
140 extraverted individuals and contribute to differences in well-being (e.g., individual differences in the
141 dopaminergic system; DeYoung, 2013). In addition, individual differences in extraversion may reflect
142 a set of cognitive and affective processes that cause people to experience the world more positively.
143 For instance, people with high extraversion may be more optimistic in general (Sharpe et al., 2011) and
144 may react more strongly to rewards (Lucas & Baird, 2004; Smillie et al., 2012), causing them to
145 experience higher levels of positive affect. Finally, social interactions have been highlighted as one key
146 domain of processes that explain the relationship between extraversion and well-being (Kritzler et al.,
147 2020; Lucas & Diener, 2009; McCrae & Costa, 1991). In the following, we focus on explanations
148 involving social interactions.

149 A large body of research has shown that extraversion is related to social behaviors (Breil et al.,
150 2019). For instance, more extraverted individuals spend more time engaging in social interactions (both
151 online and offline; Asendorpf & Wilpers, 1998; Harari et al., 2020; Wilson et al., 2015) and tend to
152 have larger social networks (Wagner et al., 2014) and higher quality relationships (Berry et al., 2000;
153 Malouff et al., 2010; Wilson et al., 2015). Two (not mutually exclusive) mechanisms have been
154 suggested to describe the role of social interactions in explaining the relationship between extraversion
155 and well-being: social participation and social reactivity.

156 *Social Participation*

157 The social participation hypothesis posits that the link between extraversion and well-being can
158 be explained by the frequency of social interactions, that is, individuals high in extraversion engage in
159 social interactions more often. Because more extraverted individuals interact more frequently, and
160 social interactions are linked to higher well-being, individuals high in extraversion should experience
161 higher well-being on average (Argyle & Lu, 1990; Lucas et al., 2008; Pavot et al., 1990; Srivastava et

162 al., 2008). In statistical terms, social interaction frequency should *mediate* the effect of extraversion on
163 well-being (Figure 1b).

164 There is considerable evidence that more extraverted individuals engage in more social
165 interactions (Asendorpf & Wilpers, 1998; Harari et al., 2020; Wilson et al., 2015) and that social
166 interactions are related to higher well-being (Kroencke et al., 2023; Kushlev et al., 2018; Liu et al.,
167 2019; Sun et al., 2020). However, it is unclear whether social interaction frequency accounts for the
168 relationship between extraversion and well-being. Lucas et al. (2008) tested the social participation
169 hypothesis in two studies using both experience sampling and daily diary methodology. In both studies,
170 social participation (i.e., the frequency of engaging in different types of social activities) explained part
171 of the relationship between extraversion and positive affect. Similarly, in two studies using the Day
172 Reconstruction Method (Oerlemans & Bakker, 2014; Srivastava et al., 2008), the association between
173 extraversion and positive affect was partly mediated by social activities. By contrast, in a longitudinal
174 study of college students, extraversion (measured at the beginning of college) predicted both life
175 satisfaction (at the end of college) and engagement in social activities (throughout college), but social
176 engagement did not mediate the relationship between extraversion and life satisfaction (Harris et al.,
177 2017).

178 ***Social Reactivity***

179 Another idea is that the relationship between extraversion and well-being exists because
180 individuals high in extraversion experience greater enjoyment from engaging in social interactions
181 (Diener et al., 1984; Lucas et al., 2008; Pavot et al., 1990; Srivastava et al., 2008). In other words,
182 extraversion is expected to *moderate* the relationship between social interactions and well-being
183 (Figure 1c). Such a moderation effect could explain why more extraverted individuals have higher
184 well-being, even if extraversion is not associated with social interaction frequency. For instance, if
185 extraversion is unrelated to well-being in nonsocial situations but positively related to well-being

186 during social interactions, more extraverted individuals should have higher well-being on average due
187 to their stronger social reactivity.

188 The social reactivity hypothesis can be tested in two different ways. First, in line with the
189 description above, most studies have tested the social reactivity hypothesis as a cross-level interaction
190 (i.e., whether more extraverted individuals experience greater increases in momentary well-being after
191 social compared with nonsocial situations). These studies have typically found nonsignificant effects
192 (Kroencke et al., 2023; Lucas et al., 2008; Srivastava et al., 2008; Sun et al., 2020). Second, it is
193 plausible that such cross-level interaction effects accumulate to the between-person level (i.e., that the
194 *between-person* relationship between social interaction frequency and well-being is stronger in more
195 extraverted individuals; for another paper examining between-person interactions, see Kuper et al.,
196 2022). Thus, to be most comprehensive, we tested both cross-level and between-person interaction
197 effects.

198 In summary, and in line with the social participation hypothesis, there is some evidence that
199 social interaction frequency may be one reason why more extraverted individuals are happier in their
200 everyday lives. By contrast, the social reactivity hypothesis has received less support in previous
201 studies. However, the complex relationships between extraversion, social interactions, and well-being
202 have not been tested comprehensively when social restrictions have been in place.

203 **Effects of Social Restrictions**

204 The COVID-19 pandemic caused countries all around the world to implement physical
205 distancing restrictions (Hale et al., 2021). Physical distancing provides a unique opportunity to examine
206 the relationships between extraversion, social interactions, and well-being for two reasons. First, the
207 physical distancing restrictions could be considered a quasi-experimental manipulation of social
208 interaction frequency, as they reduced opportunities for everyday social interactions. Thus, they
209 provide a quasi-experimental test of how individuals react to systematic variations in their everyday

210 social interactions and whether these effects are more pronounced in individuals high in extraversion.
211 However, few studies have explicitly examined how (different types of) social interactions changed
212 when social restrictions were in place and how changes in social interactions contributed to changes in
213 well-being in more extraverted individuals.

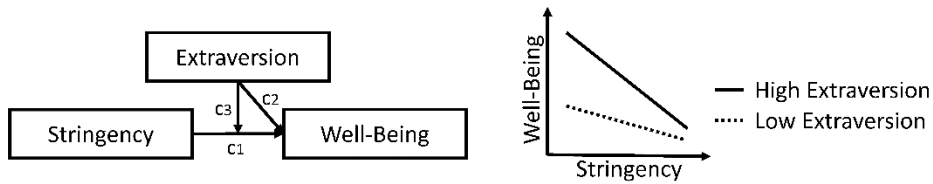
214 Second, the COVID-19 pandemic provides a unique opportunity for testing competing
215 perspectives on personality effects during societal challenges. First, it has been argued that personality
216 differences become more accentuated during new and unpredictable contexts due to a lack of clear
217 behavioral norms (Caspi & Moffitt, 1993). This perspective would suggest that the relationships
218 between personality traits and their behavioral and affective correlates in everyday life should become
219 more pronounced during the pandemic. Moreover, according to Trait Activation Theory, the pandemic
220 should activate traits that are particularly relevant in this situation (Tett et al., 2021), including social
221 traits, such as extraversion. Thus, the effects of extraversion on social interactions and well-being
222 should increase during the pandemic. Alternatively, the pandemic could be conceptualized as a strong
223 situation (Mischel, 1977) due to the governmental restrictions, which prohibited and therefore limited
224 the expression of individual differences. Thus, the pandemic should *deactivate* traits when they are not
225 as relevant. For instance, the effects of extraversion on well-being and social interaction processes may
226 decrease because of the strong behavioral pressure to avoid social contact with others (Anglim &
227 Horwood, 2021; Krämer et al., 2022).

228 This latter perspective aligns with the popular idea that more extraverted individuals suffered
229 more—in terms of decreased well-being—during the pandemic. In statistical terms, this idea is best
230 represented by a moderation effect. Specifically, extraversion could moderate the effect of regulation
231 stringency (i.e., how strict current physical distancing regulations are) on well-being, such that the
232 negative effect of regulation stringency would be more pronounced in more extraverted individuals
233 (Figure 2a).

234 This moderation effect could be explained by social participation, social reactivity, or both
235 processes: First, according to the social participation hypothesis, individuals high in extraversion
236 should have higher baseline levels of social interaction frequency in pre-pandemic times (Lucas et al.,
237 2008). These differences in baseline levels would affect how individuals with higher or lower levels of
238 extraversion would be affected by the physical distancing regulations. Whereas more introverted
239 individuals would reduce their—already infrequent—social interactions a little, more extraverted
240 individuals would experience much larger reductions in social interaction frequency. In statistical
241 terms, extraversion would moderate the effect of regulation stringency on social interactions, such that
242 the negative effect of regulation stringency on social interactions would be stronger for more
243 extraverted individuals (Figure 2b). Moreover, stronger decreases in social participation would explain
244 why more extraverted individuals would experience stronger declines in well-being during the
245 pandemic.

246 By contrast, according to the social reactivity hypothesis, extraversion should moderate the
247 effect of social interactions on well-being, such that the positive effect of social interactions on well-
248 being would be stronger for more extraverted individuals (Lucas et al., 2008). From this perspective,
249 individuals high in extraversion would suffer more from the reductions because their well-being would
250 be more contingent on their social interactions (Figure 2c).

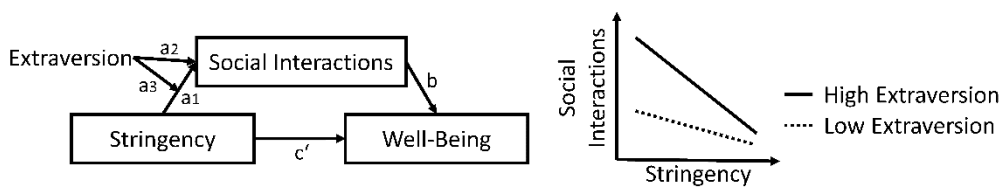
251 A moderation effect implies that the association between extraversion and well-being should be
252 reduced during the lockdown, not that it should vanish completely. For instance, Anglim and Horwood
253 (2021) found that extraversion was still positively correlated with well-being during the lockdown, but
254 the effect was attenuated. There are two reasons for why this finding seems likely: First, previous
255 studies have shown that social participation only partially mediates the relationship between
256 extraversion and well-being (Lucas et al., 2008; Oerlemans & Bakker, 2014; Srivastava et al., 2008).

257 **Figure 2**258 *Models Concerning the Effects of Social Restrictions*

259

260 (a) Model 4: Extraversion as a Moderator of the Regulation Stringency–Well-Being Relationship

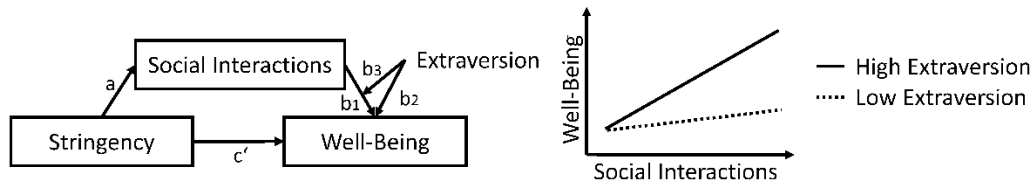
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263 (b) Model 5: Social Participation With Regulation Stringency

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266 (c) Model 6: Social Reactivity With Regulation Stringency

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269 Even beyond social participation, extraversion is robustly related to higher well-being in general
 270 (Anglim et al., 2020) and lower risk for mental health problems (Kotov et al., 2010). This effect could
 271 be due to other affective and cognitive processes that were relatively unaffected by the pandemic (e.g.,
 272 optimism or reward sensitivity, as noted earlier). Thus, even if individuals high in extraversion could
 273 not interact as much as usual during the pandemic, they could still have been happier. Second,
 274 extraversion has also been found to be related to higher success in interpersonal situations (Dilchert &
 275 Ones, 2009) and more adaptive coping strategies (Carver & Connor-Smith, 2010). These findings
 276 suggest that more extraverted individuals may be more skilled at using different forms of contact (e.g.,

277 computer-mediated communication) and more flexible in adapting to new situations. These resources
278 could have helped them cope better with the situation and maintain comparatively higher levels of
279 social interactions during the pandemic.

280 One recent study already looked at the relationships between extraversion and changes in one
281 specific indicator of well-being (social connectedness) in one undergraduate sample ($N = 467$) and one
282 community sample ($N = 336$; Folk et al., 2020). The authors reported that declines in social
283 connectedness were small overall and were not related to extraversion after baseline levels were
284 controlled for. On the basis of these findings, the authors concluded that more extraverted individuals
285 did not suffer more during the pandemic. Other studies reported that more extraverted individuals felt
286 more restricted by the physical distancing regulations (Modersitzki et al., 2021) and perceived the
287 situation more negatively (Schmiedeberg & Thönnissen, 2021). Moreover, increases in depressive
288 symptoms and loneliness were stronger for individuals high in extraversion (Entringer & Gosling,
289 2022; Wijngaards et al., 2020), indicating that more extraverted individuals were more negatively
290 affected by the pandemic. However, previous studies were limited in that they focused on only one
291 indicator of well-being (e.g., social connectedness, depressive symptoms) or general perceptions of the
292 pandemic. How well these results generalize to other well-being indicators—particularly those that are
293 more closely related to extraversion (e.g., activated positive affect)—is currently unclear.

294 **Zooming In On the Social Situation: The Role of Communication Channel and Interaction** 295 **Partner**

296 The physical distancing regulations during the COVID-19 pandemic affected not only the
297 absolute number of social interactions but also the range of social choices available. In particular,
298 individuals had to restrict face-to-face (FtF) interactions because of the high risk of infection and were
299 encouraged to increase their computer-mediated interactions (e.g., talking on the phone,
300 videoconferencing, texting) in both private and professional contexts. Previous studies have suggested

301 that FtF interactions are associated with higher well-being than computer-mediated interactions
302 (Kroencke et al., 2023; Petrova & Schulz, 2022). This finding suggests that decreases in the proportion
303 of FtF interactions may be related to lower well-being. Moreover, if more extraverted individuals profit
304 more from FtF interactions than from computer-mediated interactions, they should suffer more from a
305 reduction in FtF interactions.

306 Moreover, the physical distancing regulations affected the the range of possible interaction
307 partners, as individuals were encouraged to limit their interactions to people from the same household.
308 A large body of research has suggested that the type of interaction partner matters for well-being. For
309 instance, interactions with close ties (e.g., friends) are typically related to higher well-being than
310 interactions with weak ties (e.g., strangers; Venaglia & Lemay, 2017). Moreover, interactions with
311 friends have been associated with higher well-being than interactions with family (Buijs et al., 2022;
312 Hudson et al., 2020; Kahneman et al., 2004; Mueller et al., 2019). On the basis of these results,
313 decreases in the proportion of interactions with friends may be linked to lower well-being. In addition,
314 previous research has suggested that more extraverted individuals profit more from interactions with
315 friends than from interactions with other interaction partners (Buijs et al., 2022). Thus, more
316 extraverted individuals could suffer more from a reduction in interactions with friends than less
317 extraverted individuals.

318 **Zooming In On the Person: The Role of Extraversion Facets**

319 Personality traits are structured hierarchically, with broad domains (i.e., the Big Five)
320 subsuming narrower sub-traits, usually called facets, which may have different correlates on the basis
321 of their theoretical content (Denissen et al., 2020). For instance, the Big Five Inventory-2 (BFI-2)
322 measures three facets of extraversion, namely, sociability, assertiveness, and energy level (Soto &
323 John, 2017). The social participation hypothesis and the idea that more extraverted individuals suffered
324 more during the pandemic due to the restriction of social interactions mainly refers to the facet of

325 sociability. However, previous cross-sectional studies have reported that positive affect, happiness, and
326 life satisfaction are most closely related to energy level and not to sociability (Margolis et al., 2020),
327 thus implying that the relationship between extraversion and well-being should not be diminished when
328 physical distancing is in place. However, these ideas have not been examined empirically, particularly
329 not in everyday life with experience sampling studies that distinguish between the three facets. The
330 potentially differentiated role of extraversion facets for understanding well-being in everyday life is
331 therefore currently unknown.

332 **The Present Research**

333 Here, we built on these initial findings using large samples (total $N = 6,296$) and longitudinal
334 experience sampling designs. Data for Study 1 (biweekly online surveys) were collected between
335 March and July 2020 across 59 countries worldwide. Given that most participants provided only one
336 assessment, we focused on between-person effects in Study 1. Studies 2 and 3 (experience sampling)
337 both comprised two data collection waves that took place in Germany. Data for Study 2 were collected
338 in January 2020 (before the first nationwide lockdown) and March 2020 (during the first nationwide
339 lockdown). Data for Study 3 were collected in March 2020 (during the first nationwide lockdown) and
340 May 2020 (after the first nationwide lockdown). Thus, Studies 2 and 3 allowed us to compare well-
341 being and social interactions among participants across time (i.e., from before to during the lockdown
342 or during to after the lockdown). Each of these three studies provides comprehensive tests of the social
343 participation and social reactivity hypotheses during social restrictions. Moreover, we used the
344 COVID-19 pandemic as a natural quasi-experimental setting to examine how extraverted individuals
345 reacted to systematic variations in their everyday social interactions. In all analyses, we further
346 explored the role of the social situation (i.e., communication channel and interaction partner) and the
347 facets of extraversion.

348 **Transparency and Openness**

349 We embrace the values of openness and transparency in science (Schönbrodt et al., 2015). We
350 report how we determined our sample size, all data exclusions (if any), all manipulations, and all
351 measures in the study (Simmons et al., 2012). The procedures and measures relevant to the present
352 manuscript are described in the main text. A codebook with a full description of all other procedures
353 and measures can be retrieved from <https://osf.io/xfh84/> (Study 1) and <https://osf.io/6kzx3/> (Studies 2
354 and 3). The data and statistical code necessary to reproduce the reported results can be retrieved from
355 <https://osf.io/y726z/>.

356 All three studies were preregistered; see <https://osf.io/y726z/>. At the time of the preregistration,
357 the data had already been collected for all three studies. Therefore, we preregistered the data cleaning
358 procedures and the hypotheses and statistical analyses for the present manuscript. Given that some of
359 the data for Study 1 had already been analyzed by one of the coauthors (Richard B. Slatcher), this
360 coauthor was not involved in writing the preregistration.

361 **Study 1**

362 In Study 1, we focused on the between-person relationships between extraversion, social
363 interactions, and well-being when social restrictions were in place.

364 **Method**

365 *Participants*

366 The original sample included 5,575 participants. Data from 953 participants were excluded
367 during data cleaning (for more details, see Supplement A), resulting in a final sample of 4,622
368 participants (78% female; $M_{\text{age}} = 31.38$ years, $SD_{\text{age}} = 12.31$, $\text{Range}_{\text{age}}: 16\text{--}91$) from 59 different
369 countries. The most common countries were Spain ($n = 1,315$), the United States ($n = 1,314$),
370 Switzerland ($n = 309$), Turkey ($n = 303$), Portugal ($n = 228$), and Canada ($n = 223$). Most participants
371 had completed at least some university education (86%) and were either students (41%) or were
372 working full- or part-time (49%). The majority of participants were dating or in a relationship (73%)

373 and living with at least one other person (85%). Participants were recruited via social media and the
374 project website (<https://loveinthetimeofcovid.me/>). To be eligible to participate, participants had to be
375 18 years old. Participation was voluntary, and no compensation was offered for participation.

376 *Procedures*

377 The data were collected as part of a longitudinal study on the effects of the COVID-19
378 pandemic on social relationships and well-being (<https://loveinthetimeofcovid.me/>). The study was
379 launched on March 27, 2020, shortly after the World Health Organization had declared a global
380 pandemic. Participants first (T1) completed an online survey on their demographics, personality traits
381 (e.g., extraversion), and experiences since the onset of the pandemic. Subsequently, they were invited
382 via email to complete a biweekly follow-up survey on their experiences during the past 2 weeks
383 (including their well-being and social activities). For the present project, we analyzed the first six
384 waves of data (T1–T6) spanning a total of 3 months. The average participant completed 2.28 surveys
385 ($SD = 1.67$). Out of the 4,622 participants, 2,361 participants (51%) completed only one survey, 753
386 participants (16%) completed two surveys, and 1,508 participants (33%) completed at least three
387 surveys. The surveys were available in 11 different languages (English, Spanish, French, Turkish,
388 Italian, German, Indonesian, Dutch, Thai, Portuguese, and Chinese), and data were collected
389 worldwide. The last biweekly survey was completed on July 19, 2020. Note that additional surveys
390 were sent out after that date with increasing time lags (i.e., monthly, every 4 months), but we included
391 only the biweekly surveys for this project. All procedures used in this study were approved by the
392 review board of the University of Georgia.

393 *Measures*

394 Means and standard deviations for all measures can be found in the descriptive statistics table
395 (Table S1) in Supplement A.

396 **Demographic Information.** At T1, participants indicated their gender, age, education, and
397 occupation. Moreover, participants reported their relationship status and living situation at all six time
398 points (T1–T6).¹ These variables were included as control variables in additional robustness analyses
399 (see “Robustness Analyses” below). Participants also indicated the country they were currently living
400 in. This information was used to determine the strictness of the COVID-19-related regulations (see
401 below).

402 **Extraversion.** At T1, participants completed the BFI-2-XS (Soto & John, 2017). The
403 extraversion subscale begins with the item stem “I am someone who:” and comprises the following
404 three items: “Tends to be quiet” (reverse-coded), “Is dominant, acts as a leader,” and “Is full of
405 energy.” These items were rated using 5-point rating scales ranging from 1 (*strongly disagree*) to 5
406 (*strongly agree*). We aggregated these items by creating a mean per participant. Reliability was
407 acceptable ($\omega = .55$) and in line with other studies that have used this measure (e.g., Soto & John,
408 2017).

409 **Well-Being.** At all six time points (T1–T6), participants were asked about their well-being
410 during the past 2 weeks. Affective well-being was measured with selected items from the PANAS-X
411 (Watson & Clark, 1994). In the present study, we focused on the item “Over the past two weeks, I’ve
412 felt happy,” to which participants indicated their agreement on a 5-point rating scale ranging from 1
413 (*very slightly or not at all*) to 5 (*extremely*). Additional items (i.e., excited, inspired, active) were
414 analyzed as part of the robustness analyses (see below). One item from the Satisfaction with Life Scale
415 (Diener et al., 1985) was administered to assess cognitive well-being. The item read “In the last two
416 weeks, I have been completely satisfied with my life” and was rated using a 7-point rating scale
417 ranging from 1 (*not at all*) to 7 (*completely*).

¹ Please see the codebook on the OSF (<https://osf.io/xfh84/>) or Supplement A for the exact wording of the questions and response options.

418 **Social Time.**² At all six time points (T1–T6), participants indicated how often over the past 2
419 weeks they had spent time with others; separately for FtF (i.e., in-person) interactions with family,
420 friends, and colleagues (3 items) and for online interactions (e.g., videocalls) with family, friends, and
421 colleagues (3 items). All six items were rated using 4-point rating scales ranging from 1 (*never*) to 4
422 (*every day*). These items were averaged to create a composite measure of social time per time point per
423 participant. To examine the effects of different communication channels, we created two separate
424 composite scores (3 items each) for *in-person* and *online* social time, respectively. To examine the
425 effects of different interaction partners, we created three separate composite scores (2 items each) for
426 social time with *family*, *friends*, and *colleagues*, respectively.

427 **Regulation Stringency.** Regulation stringency was not rated by participants but was
428 determined on the basis of objective data from an independent source. Specifically, we looked up the
429 strictness of the COVID-19-related regulations using the Oxford COVID-19 Government Response
430 Tracker (Hale et al., 2021). The tracker collects information on publicly available indicators of
431 government responses to the COVID-19 pandemic that are aggregated into four government response
432 indices (overall government response index, containment and health index, stringency index, economic
433 support index) per country per day. For the present analyses, we used the stringency index, which
434 records the strictness of “containment and closure policies, sometimes referred to as lockdown
435 policies” (Hale et al., 2021, p. 536) per country per day.

436 The stringency index combines information on the following nine indicators: school closures,
437 workplace closures, cancelation of public events, restrictions on gatherings, closure of public transport,
438 stay at home requirements, restrictions on movement, restrictions on international travel, and presence
439 of public information campaigns. All indicators were scored on ordinal scales (e.g., school closures: 0

² This social time variable is a continuous measure of social interactions used only in Study 1. In Studies 2 and 3, the measure of social interactions is dichotomous.

440 = no regulations, 1 = recommend closing or significant differences compared to non-Covid-19
441 operations, 2 = require closing some levels or categories, 3 = require closing all levels) and then
442 transformed and combined into a single aggregate score ranging from 0 (no regulations) to 100 (total
443 lockdown) per country per day. Because the surveys referred to the last 2 weeks, we averaged all scores
444 from the respective participant's country over the last 14 days. To ease interpretation, we divided the
445 scores by 100 so that the variable ranged from 0 (no regulations) to 1 (total lockdown; Wijngaards et
446 al., 2020).

447 *Analytical Strategy*

448 **General Analytical Strategy.** The data were analyzed with Multilevel Structural Equation
449 Modeling (MSEM) in *Mplus* version 8.6 (Muthén & Muthén, 1998-2017). In all three studies,
450 continuous variables were either standardized using the grand mean and grand *SD* (i.e., extraversion
451 and well-being) or centered at the grand mean (i.e., social time [Study 1] and regulation stringency)
452 prior to the analysis. Binary variables (i.e., social interactions [Studies 2 and 3]) were retained on their
453 original scales. As part of the modeling strategy, all time-varying variables (i.e., well-being, social
454 time, social interactions, and regulation stringency) were decomposed into their within- and between-
455 person components as described below. Fully standardized estimates are available in Supplement B.
456 Standardization was done with respect to the level-specific variances, as implemented in *Mplus*.

457 We estimated all models with Bayesian estimation in *Mplus*, using the *Mplus* defaults for the
458 (uninformative) priors and the Gibbs sampler. Given that the *Mplus* default convergence criterion
459 (Potential Scale Reduction [PSR] < 1.05) typically stops too early (Zitzmann & Hecht, 2019), we tested
460 which PSR is needed to achieve acceptable convergence for the most complex models (evaluated on
461 the basis of the effective sample sizes, trace plots, histograms, and autocorrelation plots; Depaoli & van
462 de Schoot, 2017; Zitzmann & Hecht, 2019). On the basis of these pretests, we chose PSR < 1.01 as the
463 stopping rule for our analyses (for more details, see Supplement A). Bayesian credibility intervals and

464 Bayesian p -values allowed us to test the significance of all model parameters, including indirect effects
465 which have nonnormal distributions (Preacher et al., 2011). We used a conservative significance
466 criterion ($p < .005$, one-tailed) due to the large number of statistical tests and the large sample sizes.

467 **Study-Specific Analytical Strategy for Study 1.** In Study 1, we focused on between-person
468 effects because more than half of the participants provided only one assessment. That is, the models
469 estimated in Study 1 refer to, for example, the association between extraversion and individuals'
470 within-person *average* well-being across the measured time points. We estimated these person means
471 as latent variables within the MSEM model to obtain more accurate between-person estimates than
472 would be the case with manually computed means (Asparouhov & Muthén, 2019; Lüdtke et al., 2008).
473 We specified six models that reflect the different kinds of associations implied by the theory. We will
474 now briefly describe all the models, focusing on the aspects of the models that are relevant for testing
475 our hypotheses. We provide graphical depictions of all models in Figures 1 (Models 1–3) and 2
476 (Models 4–6) and formulas for all models in the Appendix (Table A1). Each of the six models was
477 estimated separately for happiness and life satisfaction as the outcome variable, resulting in a total of
478 12 ($6*2$) main models.

479 **Effects of Extraversion.**

480 ***Model 1: Main Effect on Well-Being.*** We first tested the main effect of extraversion on well-
481 being by regressing the latent person mean for well-being on extraversion (Figure 1a, path c , Equation
482 1b). We expected that extraversion would be positively related to well-being (path $c > 0$).

483 ***Model 2: Social Participation.*** Next, we specified the mediation model depicted in Figure 1b.
484 That is, we regressed the latent person mean for social time on extraversion (path a , Equation 2b), and
485 we regressed the latent person mean for well-being on the latent person mean for social time (path b)
486 and on extraversion (path c' , Equation 3b). The indirect effect was calculated as the product of paths a
487 and b (Equation 4; Preacher et al., 2011). We expected a positive indirect effect because this would

488 indicate that the positive effect of extraversion on well-being could (partly) be explained by more
489 extraverted individuals spending more time socializing, which in turn is related to higher well-being.

490 ***Model 3: Social Reactivity.*** In the next analytical step, we specified the moderation model
491 depicted in Figure 1c at the between-person level, using the latent moderated structural equations
492 method (Preacher et al., 2016). That is, we regressed the latent person mean for well-being on the latent
493 person mean for social time (path $b1$), extraversion (path $b2$), and their latent between-person
494 interaction (path $b3$, Equation 5b). We expected a positive interaction effect (path $b3 > 0$), such that the
495 positive effect of social time on well-being would be stronger for more extraverted individuals.

496 **Effects of Social Restrictions.**

497 ***Model 4: Extraversion as a Moderator of the Regulation Stringency–Well-Being***

498 ***Relationship.*** To test whether more extraverted individuals suffered more when physical distancing
499 was in place, we specified the moderation model depicted in Figure 2a at the between-person level
500 (Equation 6b). We expected a negative interaction effect (path $c3 < 0$), such that the negative effect of
501 regulation stringency on well-being would be stronger for more extraverted individuals.

502 ***Model 5: Social Participation With Regulation Stringency.*** We next included social time as a
503 mediator of the relationship between regulation stringency and well-being and tested whether
504 extraversion moderated path a of the indirect effect (Figure 2b, Equations 7b and 8b; Preacher et al.,
505 2007). We expected a negative interaction effect (path $a3 < 0$), such that the negative effect of
506 regulation stringency on social time would be stronger for more extraverted individuals. In line with
507 Hayes et al. (2015), moderated mediation was tested as the product of paths $a3$ and b (Equation 9). The
508 product term indicated whether the indirect effect was stronger for more extraverted individuals due to
509 stronger decreases in social participation.

510 ***Model 6: Social Reactivity With Regulation Stringency.*** Finally, we tested whether

511 extraversion moderated path b of the indirect effect (Figure 2c, Equations 10b and 11b; Preacher et al.,

512 2007). We expected a positive interaction effect (path $b_3 > 0$), such that the positive effect of social
513 time on well-being would be stronger for more extraverted individuals. We calculated the product of
514 paths a and b_3 (Equation 12), which indicated whether the indirect effect was stronger for more
515 extraverted individuals due to stronger social reactivity.

516 **Exploratory Analyses: Zooming In On the Social Situation.** To zoom in on the social
517 situation, we used specific communication channels (i.e., in-person social time, online social time) and
518 interaction partners (i.e., social time with family, social time with friends, social time with colleagues)
519 as mediators of the relationship between regulation stringency and well-being. We could not zoom in
520 on the person (i.e., examine facets of extraversion) in Study 1, as our measure of extraversion was too
521 short for calculating facets.

522 **Robustness Analyses.** We ran four sets of robustness analyses. First, we tested the effects for
523 different well-being adjectives (i.e., excited, inspired, active) to check whether our results depended on
524 the specific type of well-being variable used. Second, we replaced the continuous regulation stringency
525 variable with a dummy variable (i.e., 0 = *no lockdown*, 1 = *lockdown*) to check whether the results held
526 up when we used the originally preregistered approach (see below). We used 70 as a cut-off because
527 the lockdown in Germany was characterized by values higher than 70. However, because this value is
528 somewhat arbitrary, we only present these results as robustness analyses. Third, we reran the main
529 models while controlling for demographic variables (categorical variables were dummy-coded,
530 continuous variables were centered at the grand mean). Finally, as suggested by a reviewer, we reran
531 the main models for the other Big Five traits (i.e., agreeableness, neuroticism, conscientiousness, and
532 openness).

533 **Deviations From the Preregistration.** We preregistered Models 1–3 (Figure 1) and Model 4
534 (Figure 2a). Additionally, we had planned to investigate whether the effect of social time on well-being
535 as well as the moderating effect of extraversion on the social time–well-being relationship changed

536 during the lockdown. However, during the writing process, we realized that our theoretical questions
537 could be more accurately represented by Models 5 and 6 (Figures 2b and 2c).

538 Further deviations from the preregistration included the following: First, we had preregistered
539 that we would examine effects on both the between- and within-person level. However, the average
540 number of assessments per participant was so small in Study 1 that estimates of within-person effects
541 would have been very unreliable (Neubauer et al., 2020). We therefore decided to focus on between-
542 person effects in Study 1. We examined the effects on both levels in Studies 2 and 3 where the number
543 of assessments was sufficient. Second, we had preregistered that we would use manual person means
544 for the mediation models and standard multilevel modeling for the moderation models. We later
545 switched to MSEM (including latent person means) because this approach is better suited to estimate
546 the more complex models that extend the preregistration (see above) and yields more accurate results
547 for the preregistered models. Third, we used a continuous instead of a dichotomous lockdown measure
548 (see above). Fourth, we did not calculate an aggregate of happiness and life satisfaction because we
549 decided to present the results for affective and cognitive well-being separately. Fifth, we did not control
550 for time effects (i.e., measurement wave, day of data collection) because the time variables are largely
551 redundant with regulation stringency, and including them would render the effects of regulation
552 stringency uninterpretable. Finally, we used Bayesian credibility intervals instead of bootstrapping to
553 calculate the standard errors of the indirect effects (see above).

554 **Results and Discussion**

555 Descriptive statistics for all focal variables are presented in Table S1 (Supplement A;
556 <https://osf.io/y726z/>). An overview of the results from the six main models (depicted in Figures 1 and
557 2) is presented in Table 1 (first and second columns).

558 *Effects of Extraversion*

559 **Main Effect on Well-Being.** As expected, extraversion was positively related to happiness and
560 life satisfaction (Table 1, Model 1, path *cb*).

561 **Social Participation.** Our results were in line with the social participation hypothesis (Table 1,
562 Model 2): More extraverted individuals spent more time socializing than more introverted individuals
563 (path *ab*), and individuals who spent more time socializing had higher well-being than those who spent
564 less time socializing (path *bb*). The indirect effect of extraversion on well-being via social time was
565 significant (happiness: $b_{ab} = 0.021, p < .001$; life satisfaction: $b_{ab} = 0.016, p < .001$), indicating that
566 social participation explained part of the relationship between extraversion and well-being. However,
567 most of the association was direct (i.e., not mediated by social time; happiness: $b_{c'} = 0.132, p < .001$;
568 life satisfaction: $b_{c'} = 0.092, p < .001$). When we zoomed in on different types of social activities as
569 part of our exploratory analyses, we found that the effect of extraversion on well-being was mediated
570 by the time participants spent socializing in person and online (Table 2, Model 2) as well as by the time
571 they spent socializing with family, friends, and colleagues (except for the effect of extraversion on life
572 satisfaction via social time with friends, as social time with friends was not significantly related to life
573 satisfaction; Table 3, Model 2).

574 **Social Reactivity.** We found no support for the social reactivity hypothesis at the between-
575 person level. As shown in Table 1 (Model 3), extraversion did not moderate the between-person effect
576 of social time on happiness (path *bb3*), indicating that the relationship between social time and
577 happiness was unrelated to participants' extraversion levels. Extraversion moderated the between-
578 person effect of social time on life satisfaction, but the direction of the effect was opposite our
579 theoretical expectations: Among *introverted* individuals (operationalized as individuals whose
580 extraversion level was 1 *SD* below average), social time was more strongly related to life satisfaction
581 (conditional slope of 0.417, $p < .001$) than among extraverted individuals (extraversion level 1 *SD*
582 above average; conditional slope of 0.151, $p = .010$).

583 **Table 1**

584 *Overview of Results*

Models	Path	Study 1		Study 2	Study 3
		Happiness	Life satisfaction	Positive affect	Positive affect
Model 1: Main effect on well-being					
Extraversion → well-being	cb	0.153 [0.119, 0.188], <i>p</i> < .001	0.109 [0.075, 0.143], <i>p</i> < .001	0.108 [0.033, 0.181], <i>p</i> < .001	0.120 [0.081, 0.158], <i>p</i> < .001
Model 2: Social participation					
Extraversion → social interactions ^a	ab	0.059 [0.044, 0.073], <i>p</i> < .001	0.059 [0.044, 0.073], <i>p</i> < .001	0.087 [0.015, 0.159], <i>p</i> = .001	0.152 [0.109, 0.195], <i>p</i> < .001
Social interactions ^a → well-being	bb	0.359 [0.239, 0.479], <i>p</i> < .001	0.280 [0.160, 0.401], <i>p</i> < .001	0.234 [0.058, 0.409], <i>p</i> < .001	0.074 [0.001, 0.147], <i>p</i> = .005
Extraversion → well-being	c ^b	0.132 [0.097, 0.166], <i>p</i> < .001	0.092 [0.057, 0.128], <i>p</i> < .001	0.087 [0.011, 0.162], <i>p</i> = .002	0.109 [0.069, 0.148], <i>p</i> < .001
Indirect effect		0.021 [0.013, 0.030], <i>p</i> < .001	0.016 [0.009, 0.025], <i>p</i> < .001	0.019 [0.002, 0.048], <i>p</i> = .001	0.011 [0.000, 0.024], <i>p</i> = .005
Model 3: Social reactivity					
Extraversion × Social Interactions ^a → well-being	bb3 bw3	-0.088 [-0.205, 0.031], <i>p</i> = .029	-0.134 [-0.258, -0.016], <i>p</i> = .001	-0.029 [-0.191, 0.130], <i>p</i> = .322 0.030 [-0.007, 0.067], <i>p</i> = .020	0.002 [-0.066, 0.070], <i>p</i> = .465 0.015 [-0.008, 0.037], <i>p</i> = .039
Model 4: Extraversion as a moderator of the regulation stringency–well-being relationship					
Stringency → well-being	cb1 cw1	-3.256 [-4.705, -1.937], <i>p</i> < .001	-3.223 [-4.590, -1.878], <i>p</i> < .001	0.224 [-0.173, 0.617], <i>p</i> = .076 0.073 [-0.029, 0.171], <i>p</i> = .030	-0.322 [-1.149, 0.494], <i>p</i> = .150 -0.361 [-0.623, -0.103], <i>p</i> < .001
Extraversion × Stringency → well-being	cb3 cw3	-0.261 [-1.539, 1.065], <i>p</i> = .312	-0.729 [-2.050, 0.479], <i>p</i> = .067	0.038 [-0.365, 0.424], <i>p</i> = .408 -0.023 [-0.122, 0.076], <i>p</i> = .258	-0.531 [-1.346, 0.242], <i>p</i> = .038 -0.056 [-0.312, 0.211], <i>p</i> = .281
Model 5: Social participation with regulation stringency					
Stringency → social interactions ^a	ab1 aw1	0.054 [-0.525, 0.635], <i>p</i> = .405	0.076 [-0.495, 0.652], <i>p</i> = .369	0.284 [-0.112, 0.678], <i>p</i> = .031 -0.029 [-0.180, 0.123], <i>p</i> = .311	-0.839 [-1.750, 0.072], <i>p</i> = .009 -0.166 [-0.513, 0.183], <i>p</i> = .107
Social interactions ^a → well-being	bb bw	0.366 [0.245, 0.486], <i>p</i> < .001	0.289 [0.167, 0.412], <i>p</i> < .001	0.225 [0.052, 0.400], <i>p</i> < .001 0.168 [0.129, 0.206], <i>p</i> < .001	0.075 [0.002, 0.151], <i>p</i> = .004 0.056 [0.035, 0.078], <i>p</i> < .001
Stringency → well-being	c ^b 1 c ^w 1	-3.340 [-4.718, -1.999], <i>p</i> < .001	-3.290 [-4.727, -1.962], <i>p</i> < .001	0.153 [-0.243, 0.553], <i>p</i> = .160 0.052 [-0.045, 0.150], <i>p</i> = .082	-0.275 [-1.087, 0.527], <i>p</i> = .188 -0.361 [-0.618, -0.101], <i>p</i> < .001
Indirect effect		0.019 [-0.188, 0.255], <i>p</i> = .405	0.021 [-0.137, 0.215], <i>p</i> = .369	0.060 [-0.025, 0.193], <i>p</i> = .032 0.021 [-0.025, 0.071], <i>p</i> = .112	-0.058 [-0.185, 0.008], <i>p</i> = .013 0.009 [-0.097, 0.115], <i>p</i> = .416
Extraversion × Stringency → social interactions ^a	ab3 aw3	0.070 [-0.467, 0.610], <i>p</i> = .368	0.102 [-0.448, 0.656], <i>p</i> = .316	-0.064 [-0.462, 0.338], <i>p</i> = .342 -0.066 [-0.218, 0.084], <i>p</i> = .128	-0.584 [-1.486, 0.320], <i>p</i> = .048 -0.013 [-0.368, 0.335], <i>p</i> = .461
Moderated mediation effect		0.025 [-0.173, 0.236], <i>p</i> = .368	0.029 [-0.134, 0.205], <i>p</i> = .316	-0.013 [-0.124, 0.086], <i>p</i> = .342 -0.011 [-0.037, 0.014], <i>p</i> = .128	-0.040 [-0.153, 0.026], <i>p</i> = .052 -0.001 [-0.022, 0.020], <i>p</i> = .461
Model 6: Social reactivity with regulation stringency					
Extraversion × Social Interactions ^a → well-being	bb3 bw3	-0.097 [-0.214, 0.021], <i>p</i> = .016	-0.142 [-0.265, -0.023], <i>p</i> = .001	-0.033 [-0.190, 0.124], <i>p</i> = .292 0.031 [-0.008, 0.070], <i>p</i> = .021	0.003 [-0.067, 0.073], <i>p</i> = .452 0.015 [-0.007, 0.037], <i>p</i> = .038
Moderated mediation effect		-0.004 [-0.057, 0.040], <i>p</i> = .359	-0.005 [-0.071, 0.057], <i>p</i> = .383	-0.007 [-0.079, 0.046], <i>p</i> = .303 -0.001 [-0.008, 0.005], <i>p</i> = .338	-0.001 [-0.047, 0.041], <i>p</i> = .458 -0.002 [-0.012, 0.003], <i>p</i> = .134

585 *Note.* Unstandardized coefficients with 99% credibility intervals and one tailed *p*-values are presented. Only coefficients that are relevant for testing the hypotheses are shown in the manuscript. Full models can

586 be found in Supplement B. All models were estimated with the Bayesian estimator with uninformative priors. Coefficients that are significant at *p* < .005 are printed in bold.

587

^aIn Study 1, social time was the measure of social interactions.

588 **Table 2**589 *Exploratory Analyses: Zooming In On the Communication Channel (Study 1)*

Models	Path	Happiness		Life satisfaction	
		In person	Online	In person	Online
Model 2: Social participation					
Extraversion → social time	ab	0.022 [0.003, 0.041], <i>p</i> = .001	0.095 [0.071, 0.118], <i>p</i> < .001	0.022 [0.003, 0.041], <i>p</i> = .001	0.095 [0.071, 0.118], <i>p</i> < .001
Social time → well-being	bb	0.267 [0.173, 0.361], <i>p</i> < .001	0.110 [0.035, 0.186], <i>p</i> < .001	0.195 [0.100, 0.290], <i>p</i> < .001	0.095 [0.019, 0.171], <i>p</i> = .001
Extraversion → well-being	c'b	0.147 [0.113, 0.181], <i>p</i> < .001	0.143 [0.108, 0.177], <i>p</i> < .001	0.104 [0.070, 0.140], <i>p</i> < .001	0.100 [0.064, 0.136], <i>p</i> < .001
Indirect effect		0.006 [0.001, 0.012], <i>p</i> = .001	0.010 [0.003, 0.019], <i>p</i> < .001	0.004 [0.001, 0.009], <i>p</i> = .001	0.009 [0.002, 0.017], <i>p</i> = .001
Model 3: Social reactivity					
Extraversion × Social Time → well-being	bb3	-0.055 [-0.146, 0.036], <i>p</i> = .060	-0.039 [-0.112, 0.037], <i>p</i> = .088	-0.065 [-0.163, 0.034], <i>p</i> = .045	-0.063 [-0.140, 0.013], <i>p</i> = .014
Model 5: Social participation with regulation stringency					
Stringency → social time	ab1	-1.686 [-2.453, -0.944], <i>p</i> < .001	1.904 [0.962, 2.876], <i>p</i> < .001	-1.673 [-2.428, -0.949], <i>p</i> < .001	1.928 [1.016, 2.930], <i>p</i> < .001
Social time → well-being	bb	0.216 [0.119, 0.314], <i>p</i> < .001	0.160 [0.080, 0.239], <i>p</i> < .001	0.142 [0.043, 0.242], <i>p</i> < .001	0.147 [0.066, 0.227], <i>p</i> < .001
Stringency → well-being	c'b1	-2.868 [-4.263, -1.502], <i>p</i> < .001	-3.607 [-5.037, -2.211], <i>p</i> < .001	-2.919 [-4.362, -1.567], <i>p</i> < .001	-3.575 [-5.076, -2.206], <i>p</i> < .001
Indirect effect		-0.359 [-0.611, -0.177], <i>p</i> < .001	0.299 [0.112, 0.586], <i>p</i> < .001	-0.232 [-0.447, -0.071], <i>p</i> < .001	0.279 [0.097, 0.562], <i>p</i> < .001
Extraversion × Stringency → social time	ab3	-0.459 [-1.161, 0.247], <i>p</i> = .045	0.680 [-0.173, 1.553], <i>p</i> = .018	-0.431 [-1.124, 0.271], <i>p</i> = .056	0.707 [-0.148, 1.576], <i>p</i> = .017
Moderated mediation effect		-0.096 [-0.279, 0.053], <i>p</i> = .045	0.105 [-0.027, 0.286], <i>p</i> = .018	-0.057 [-0.193, 0.040], <i>p</i> = .056	0.100 [-0.021, 0.277], <i>p</i> = .017
Model 6: Social reactivity with regulation stringency					
Extraversion × Social Time → well-being	bb3	-0.061 [-0.156, 0.034], <i>p</i> = .047	-0.042 [-0.117, 0.032], <i>p</i> = .073	-0.070 [-0.168, 0.025], <i>p</i> = .028	-0.069 [-0.147, 0.006], <i>p</i> = .009
Moderated mediation effect		0.061 [-0.036, 0.182], <i>p</i> = .047	-0.049 [-0.158, 0.041], <i>p</i> = .073	0.073 [-0.027, 0.202], <i>p</i> = .028	-0.080 [-0.200, 0.007], <i>p</i> = .009

590 *Note.* Unstandardized coefficients with 99% credibility intervals and one tailed *p*-values are presented. Only coefficients that are relevant for testing the hypotheses are shown in the manuscript. Full models can

591 be found in Supplement B. All models were estimated with the Bayesian estimator with uninformative priors. Coefficients that are significant at *p* < .005 are printed in bold.

592 **Table 3**

593 *Exploratory Analyses: Zooming In On the Interaction Partner (Study 1)*

Models	Path	Happiness		
		Family	Friends	Colleagues
Model 2: Social participation				
Extraversion → social time	ab	0.065 [0.039, 0.093], <i>p</i> < .001	0.068 [0.049, 0.088], <i>p</i> < .001	0.041 [0.021, 0.062], <i>p</i> < .001
Social time → well-being	bb	0.147 [0.081, 0.213], <i>p</i> < .001	0.169 [0.074, 0.261], <i>p</i> < .001	0.145 [0.062, 0.228], <i>p</i> < .001
Extraversion → well-being	c'b	0.143 [0.109, 0.177], <i>p</i> < .001	0.142 [0.107, 0.176], <i>p</i> < .001	0.147 [0.112, 0.181], <i>p</i> < .001
Indirect effect		0.009 [0.005, 0.016], <i>p</i> < .001	0.011 [0.005, 0.019], <i>p</i> < .001	0.006 [0.002, 0.011], <i>p</i> < .001
Model 3: Social reactivity				
Extraversion × Social Time → well-being	bb3	-0.033 [-0.097, 0.032], <i>p</i> = .102	-0.073 [-0.160, 0.017], <i>p</i> = .017	0.000 [-0.083, 0.081], <i>p</i> = .498
Model 5: Social participation with regulation stringency				
Stringency → social time	ab1	1.911 [0.878, 2.971], <i>p</i> < .001	-1.040 [-1.818, -0.281], <i>p</i> < .001	-0.752 [-1.580, 0.073], <i>p</i> = .010
Social time → well-being	bb	0.185 [0.117, 0.253], <i>p</i> < .001	0.138 [0.042, 0.232], <i>p</i> < .001	0.125 [0.041, 0.210], <i>p</i> < .001
Stringency → well-being	c'b1	-3.656 [-5.071, -2.284], <i>p</i> < .001	-3.140 [-4.522, -1.791], <i>p</i> < .001	-3.170 [-4.578, -1.835], <i>p</i> < .001
Indirect effect		0.349 [0.138, 0.652], <i>p</i> < .001	-0.137 [-0.302, -0.030], <i>p</i> < .001	-0.089 [-0.227, 0.009], <i>p</i> = .010
Extraversion × Stringency → social time	ab3	0.020 [-0.955, 1.025], <i>p</i> = .479	0.059 [-0.687, 0.797], <i>p</i> = .418	0.036 [-0.761, 0.826], <i>p</i> = .453
Moderated mediation effect		0.004 [-0.181, 0.196], <i>p</i> = .479	0.008 [-0.103, 0.127], <i>p</i> = .418	0.004 [-0.105, 0.119], <i>p</i> = .453
Model 6: Social reactivity with regulation stringency				
Extraversion × Social Time → well-being	bb3	-0.037 [-0.102, 0.028], <i>p</i> = .072	-0.075 [-0.167, 0.016], <i>p</i> = .017	-0.001 [-0.085, 0.081], <i>p</i> = .485
Moderated mediation effect		-0.046 [-0.148, 0.037], <i>p</i> = .072	0.045 [-0.010, 0.137], <i>p</i> = .017	0.000 [-0.051, 0.054], <i>p</i> = .484
			Life satisfaction	
		Family	Friends	Colleagues
Model 2: Social participation				
Extraversion → social time	ab	0.066 [0.039, 0.092], <i>p</i> < .001	0.069 [0.049, 0.088], <i>p</i> < .001	0.041 [0.020, 0.061], <i>p</i> < .001
Social time → well-being	bb	0.128 [0.061, 0.195], <i>p</i> < .001	-0.010 [-0.105, 0.085], <i>p</i> = .389	0.211 [0.127, 0.296], <i>p</i> < .001
Extraversion → well-being	c'b	0.100 [0.065, 0.136], <i>p</i> < .001	0.110 [0.074, 0.146], <i>p</i> < .001	0.100 [0.065, 0.134], <i>p</i> < .001
Indirect effect		0.008 [0.004, 0.015], <i>p</i> < .001	-0.001 [-0.007, 0.006], <i>p</i> = .389	0.009 [0.004, 0.015], <i>p</i> < .001
Model 3: Social reactivity				
Extraversion × Social Time → well-being	bb3	-0.038 [-0.105, 0.029], <i>p</i> = .071	-0.086 [-0.182, 0.009], <i>p</i> = .009	-0.039 [-0.123, 0.045], <i>p</i> = .118
Model 5: Social participation with regulation stringency				
Stringency → social time	ab1	1.918 [0.915, 2.983], <i>p</i> < .001	-1.012 [-1.799, -0.252], <i>p</i> < .001	-0.735 [-1.540, 0.064], <i>p</i> = .009
Social time → well-being	bb	0.165 [0.095, 0.235], <i>p</i> < .001	-0.040 [-0.136, 0.057], <i>p</i> = .143	0.193 [0.108, 0.277], <i>p</i> < .001
Stringency → well-being	c'b1	-3.565 [-5.031, -2.209], <i>p</i> < .001	-3.240 [-4.671, -1.905], <i>p</i> < .001	-3.087 [-4.445, -1.739], <i>p</i> < .001
Indirect effect		0.312 [0.121, 0.596], <i>p</i> < .001	0.037 [-0.055, 0.182], <i>p</i> = .143	-0.138 [-0.316, 0.013], <i>p</i> = .009
Extraversion × Stringency → social time	ab3	0.008 [-0.988, 1.011], <i>p</i> = .492	0.092 [-0.674, 0.866], <i>p</i> = .376	0.107 [-0.684, 0.920], <i>p</i> = .365
Moderated mediation effect		0.001 [-0.168, 0.179], <i>p</i> = .492	-0.001 [-0.063, 0.048], <i>p</i> = .417	0.020 [-0.137, 0.190], <i>p</i> = .365

Model 6: Social reactivity with regulation**stringency**

Extraversion × Social Time → well-being	bb3	-0.047 [-0.114, 0.020], $p = .033$	-0.089 [-0.185, 0.003], $p = .006$	-0.040 [-0.123, 0.043], $p = .106$
Moderated mediation effect		-0.057 [-0.163, 0.024], $p = .033$	0.056 [-0.002, 0.158], $p = .007$	0.016 [-0.022, 0.081], $p = .114$

594 *Note.* Unstandardized coefficients with 99% credibility intervals and one tailed p -values are presented. Only coefficients that are relevant for testing the hypotheses are shown in the manuscript. Full models can

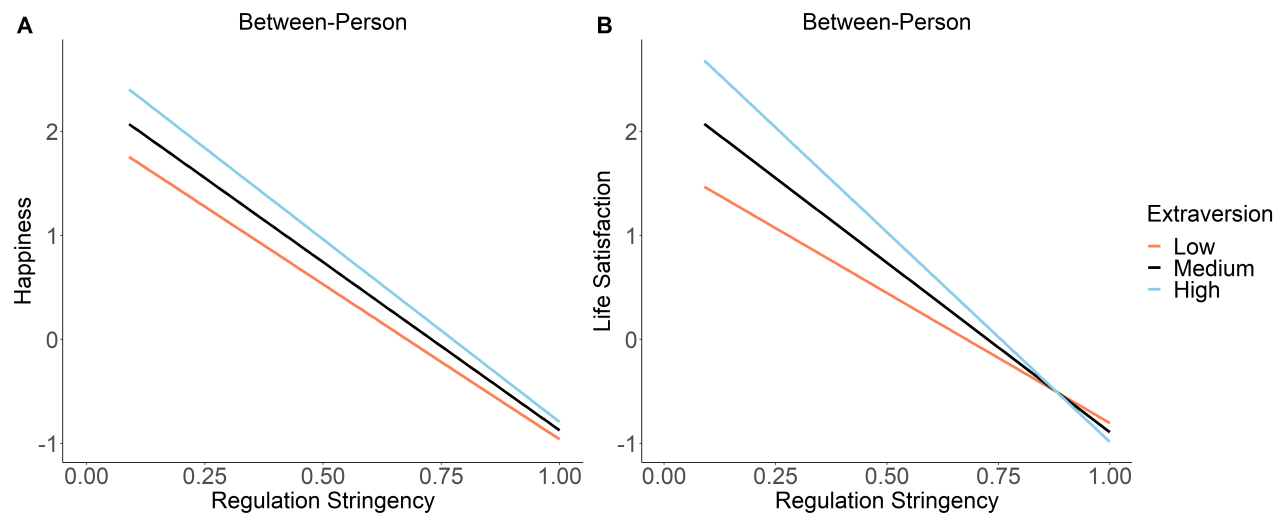
595 be found in Supplement B. All models were estimated with the Bayesian estimator with uninformative priors. Coefficients that are significant at $p < .005$ are printed in bold.

596 Our exploratory analyses showed that extraversion did not moderate reactivity to any of the more
597 specific social activities (Tables 2 and 3, Model 3, path *bb3*).

598 *Effects of Social Restrictions*

599 **Quasi-Experimental Manipulation Check.** In Study 1, the within-person means of regulation
600 stringency ranged from 14.83 to 99.26 ($M = 75.28$). We first focused on the effects of regulation
601 stringency on social time (i.e., path *ab1* in Model 5). These analyses can be understood as kind of a
602 manipulation check in the quasi-natural experiment. Overall, social time was unrelated to regulation
603 stringency at the between-person level (Table 1, Model 5, path *ab1*), suggesting that individuals who
604 participated in periods with higher average regulation stringency did not socialize less than individuals
605 who participated in periods with lower average regulation stringency. However, when zooming in on
606 different types of social activities (i.e., different communication channels and interaction partners), we
607 observed a more coherent result pattern that was in line with the physical distancing regulations:
608 Regulation stringency had negative effects on in-person social time and social time with friends but
609 positive effects on online social time and social time with family (Tables 2 and 3, Model 5, path *ab1*).

610 **Extraversion as a Moderator of the Regulation Stringency–Well-Being Relationship.** Next,
611 we tested whether extraversion moderated the between-person effect of regulation stringency on well-
612 being (Table 1, Model 4). Regulation stringency was negatively related to happiness and life
613 satisfaction at the between-person level (path *cb1*), indicating that individuals who participated in
614 periods with higher average regulation stringency reported lower well-being than those who
615 participated in periods with lower average regulation stringency. However, extraversion did not
616 moderate the between-person effect of regulation stringency on happiness and life satisfaction (path
617 *cb3*). As shown in Figure 3, the relationship between regulation stringency and well-being was
618 unrelated to extraversion and was therefore similar for more extraverted and more introverted
619 individuals.

620 **Figure 3**621 *Happiness and Life Satisfaction as a Function of Regulation Stringency and Extraversion (Study 1)*

622

623 *Note.* Between-person effects of regulation stringency on (a) happiness and (b) life satisfaction for
 624 three different levels of extraversion (Low = 1 *SD* below the mean, Medium = average, High = 1 *SD*
 625 above the mean).

626

627 **Social Participation With Regulation Stringency.** Next, we investigated whether the

628 between-person relationship between regulation stringency and well-being was mediated by reduced
 629 social time and whether extraversion moderated path *a* of this effect (Table 1, Model 5). Because our
 630 aggregated measure of social time was unrelated to regulation stringency (path *ab1*), social time could
 631 not mediate the effect of regulation stringency on well-being. Moreover, extraversion did not moderate
 632 the between-person effect of regulation stringency on social time (path *ab3*), indicating that regulation
 633 stringency was unrelated to social time for all levels of extraversion.

634 When zooming in on different types of social activities, we found that these associations varied
 635 by communication channels (Table 2, Model 5) and by interaction partners (Table 3, Model 5). First,
 636 individuals who participated in periods with higher average regulation stringency spent comparatively
 637 less time socializing in person and more time socializing online (path *ab1*). Because both in-person and

638 online social time were related to higher happiness and higher life satisfaction (path *bb*), we observed
639 two opposing indirect effects: a negative indirect effect of regulation stringency on well-being via in-
640 person social time and a positive indirect effect of regulation stringency on well-being via online social
641 time. In a similar vein, individuals who participated in periods with higher average regulation
642 stringency spent comparatively less time socializing with friends and thus experienced lower happiness
643 (negative indirect effect), but they also spent comparatively more time socializing with family and thus
644 experienced higher happiness and higher life satisfaction (positive indirect effects). However,
645 extraversion did not moderate the between-person effects of regulation stringency on time spent
646 socializing in person or time spent socializing with friends (path *ab3*). Therefore, the indirect effects
647 described above were not related to extraversion (no moderated mediation effects).

648 **Social Reactivity With Regulation Stringency.** As explained above, social time was less
649 strongly linked to life satisfaction among more extraverted individuals compared with more introverted
650 individuals. However, this moderation effect did not affect the link between regulation stringency and
651 life satisfaction because regulation stringency was not related to social time (Table 1, Model 6). We
652 observed no other significant effects (Tables 2 and 3, Model 6).

653 ***Robustness Analyses***

654 To examine the robustness of the results (see Supplement B), we first tested the effects of three
655 different well-being adjectives (excited, inspired, and active). We found robust social participation
656 effects for all three adjectives but no social reactivity effects. Regarding the effects of regulation
657 stringency, individuals who participated in periods with higher average regulation stringency felt more
658 excited, but they did not feel more or less inspired or active than individuals who participated in
659 periods with lower average regulations stringency. None of these effects were moderated by
660 extraversion. Using a dummy variable instead of the continuous regulation stringency variable or
661 controlling for demographic variables did not change any of the conclusions. Analyses involving the

662 other Big Five traits (see Supplement A) showed that social interaction frequency partially explained
663 the links between the other Big Five traits (i.e., agreeableness, neuroticism, and conscientiousness) and
664 well-being, but these indirect effects were much smaller than those observed for extraversion.
665 Moreover, the other Big Five traits did not moderate reactivity to the physical distancing regulations.

666 ***Summary***

667 The results of Study 1 underline the role of extraversion for well-being and provide high-
668 powered evidence for the robustness of this association even during times when physical distancing
669 was in place. Moreover, we found support for the social participation hypothesis, as part of the
670 relationship between extraversion and well-being was mediated by social time. However, we did not
671 find any support for the social reactivity hypothesis. For life satisfaction, we even observed the
672 opposite effect, such that the relationship between social time and life satisfaction was *less* pronounced
673 in more extraverted individuals compared with more introverted individuals.

674 We found a negative effect of regulation stringency on well-being for both well-being
675 indicators we assessed: happiness and life satisfaction. However, the negative effect of regulation
676 stringency on well-being was equally strong for participants at all levels of extraversion. Regarding the
677 role of social interactions, the relationship between regulation stringency and well-being was not
678 mediated by reduced social time *overall*. When zooming in on communication channels and interaction
679 partners, however, we found that regulation stringency was negatively related to social activities that
680 were restricted (e.g., in-person social time, social time with friends) but positively related to social
681 activities that were not affected by the physical distancing measures (e.g., online social time, social
682 time with family). These associations resulted in opposing effects on well-being: Individuals who
683 participated in periods with higher average regulation stringency had comparatively less in-person
684 contact and were therefore less happy and less satisfied, but they also had comparatively more online
685 interactions that compensated for the lack of personal contact in terms of their well-being. Similarly,

686 individuals who participated in periods with higher average regulation stringency spent comparatively
687 less time socializing with friends, which was related to lower well-being, but comparatively more time
688 socializing with family, which was associated with higher well-being. However, the differences in
689 communication channels and interaction partners between individuals who participated in periods with
690 higher versus lower average regulation stringency were similar for individuals at all levels of
691 extraversion and not differentially related to well-being.

692 In Studies 2 and 3, our goal was to (a) examine within-person effects in addition to between-
693 person effects and (b) examine facets of extraversion. To this end, we conducted two experience
694 sampling studies, one with undergraduate students (Study 2) and one in the general population (Study
695 3). Both studies comprised two data collection waves, lasting 2 weeks each and covering different
696 phases of the pandemic. Specifically, the data for Study 2 were collected *before* (starting on January
697 13, 2020) and *during* (starting on March 16, 2020) the first nationwide lockdown in Germany. The data
698 for Study 3 were collected *during* (starting on March 18, 2020) and *after* (starting on May 13, 2020) the
699 first nationwide lockdown in Germany.³ Our samples were larger than a typical ESM study in
700 psychological research (e.g., 136.6 participants in an average ESM study, cf. Wrzus & Neubauer, 2022;
701 here: 293 [Study 2] and 1,381 [Study 3] participants in our ESM studies), so that we had exceptionally
702 high power to detect small effects (Arend & Schäfer, 2019).

703 Study 2

704 Whereas Study 1 referred only to the relationship between extraversion and well-being during
705 periods with comparatively high regulation stringency, Study 2 allowed us to examine the association

³ We report the results for the student sample and for the sample from the general population separately because (a) the samples had very different demographic characteristics (e.g., in terms of the distributions of age and occupational status) and (b) the data sets were collected during different phases of the pandemic (*before* and *during* the lockdown vs. *during* and *after* the lockdown, respectively). The differences in demographic composition and pandemic phases may result in divergent effects, which would have been obscured if we had collapsed across samples. During the analyses, we also ran models on a pooled data set, which included data from both studies (see the Robustness Analyses section in Study 3). However, the models in the pooled data set were very sensitive to changes in model specifications (probably due to the divergent results across samples; see the Results sections), which lowered our confidence in the pooled results.

706 between extraversion and well-being in times of no (*before* the lockdown) and high (*during* the
707 lockdown) restrictions. Moreover, we examined both between- and within-person effects and
708 additionally compared the effects of different facets of extraversion.

709 **Method**

710 *Participants*

711 Participants in Study 2 were 293 undergraduate students at a German university. A total of 281
712 individuals (79% female; $M_{\text{age}} = 22.87$ years, $SD_{\text{age}} = 7.01$ years) participated in the first data collection
713 wave (*before* the lockdown), and 192 individuals (80% female; $M_{\text{age}} = 21.84$ years, $SD_{\text{age}} = 5.43$ years)
714 participated in the second data collection wave (*during* the lockdown). Of these, 180 individuals
715 participated in both waves (i.e., *before* and *during* the lockdown). Most participants (78%) studied
716 psychology and were in their first (37%), third (33%), or fifth (20%) semester.

717 Participants were recruited via posters and flyers at the university and via online
718 advertisements. They received three different types of compensation. First, participants could earn class
719 credit in exchange for their participation (proportional to the number of ESM surveys they completed).
720 Second, they were offered two different types of monetary compensation. In the first data collection
721 wave (*before* the lockdown), participants were entered into a lottery to win one of 25 Amazon gift
722 cards (50 Euros each). In the second data collection wave (*during* the lockdown), participants were
723 paid 10 Euros if they completed 1 week of ESM data collection and 30 Euros if they completed at least
724 80% of all the ESM surveys. Lastly, all participants received feedback on their affective well-being on
725 the basis of their ESM survey responses.

726 *Procedures*

727 The first data collection wave began in January 2020 when the pandemic had not yet reached
728 Germany. The study was programmed in formR (version v0.18.3; Arslan et al., 2020) and conducted
729 online. Upon clicking on the link to the study, participants first provided informed consent and

730 completed several trait questionnaires (e.g., demographic information, personality traits). At the end of
731 the initial online survey, participants chose their daily personal start and end times and entered their
732 email address.

733 During the 14-day ESM phase, which began the next day in the morning, participants were
734 prompted via email to complete six short ESM surveys per day. Each survey first asked participants
735 whether they had engaged in a social interaction (> 5 min) since the last assessment. Depending on
736 their answer, participants were presented with several questions about either (if *yes*) their most recent
737 social interaction or (if *no*) their most recent individual activity. Each survey included questions about
738 the context in which the interaction or activity occurred and about participants' emotional states
739 directly following the interaction or activity (completion time ~ 2 min). The surveys were sent at
740 random times between participants' daily personal start and end times, with the restriction that a survey
741 could not be sent within 40 min of the previous survey. If participants did not react to the initial email,
742 they were reminded once after 20 min. The surveys became unavailable 45 min after the reminder. The
743 morning after the ESM phase ended, participants once again provided information about their
744 personality traits.

745 In mid-March, a range of nationwide restrictions were announced in Germany, encompassing
746 the closure of many nonessential stores and facilities (Bundesregierung, 2020). On March 16, the day
747 when the restrictions came into effect, all students were invited via email to participate a second time.
748 The procedures were essentially the same (including an initial online survey, a 14-day ESM phase, and
749 a final online survey), except for the administration of additional COVID-19-related trait
750 questionnaires (e.g., risk perceptions, behavioral changes, policy evaluations), which are not part of the
751 present manuscript. All procedures used in this study were approved by the review board of the
752 University of Münster.

753 ***Data Cleaning***

754 As part of the data cleaning procedure, we removed partial reports and surveys that were
755 completed too close to each other (< 40 min between two consecutive ESM surveys) or during the
756 night due to technical errors. We also excluded all participants who completed fewer than 10 valid
757 ESM surveys ($N = 34$) and all participants who did not provide extraversion scores ($N = 1$). After data
758 cleaning, the average participant completed 101 surveys in total.

759 *Trait Measures*

760 Means and standard deviations for all measures can be found in the descriptive statistics table
761 (Table S2) in Supplement A.

762 **Demographic Information.** In the initial online survey, participants reported on a range of
763 demographic variables, including their age and gender.⁴

764 **Extraversion.** Extraversion was measured with the Interpersonal Adjective List (IAL; Jacobs &
765 Scholl, 2005). The questionnaire comprises a list of 64 adjectives. The scales Gregarious-Extraverted
766 (outgoing, communicative, open-minded, sociable, charming, courageous, interested, loyal) and Aloof-
767 Introverted (unsociable, withdrawn, solitary, reserved, reclusive, distant, rigid, uninterested; reverse-
768 coded) were averaged as an index of sociability. The scales Assured-Dominant (assertive, self-assured,
769 self-confident, persuasive, offensively-minded, dominant, straightforward, proud) and Unassured-
770 Submissive (shy, unconfident, quiet, hesitant, unobtrusive, submissive, conflict-avoidant,
771 influenceable; reverse-coded) were averaged as an index of assertiveness. Participants indicated their
772 agreement with the adjectives on 5-point rating scales ranging from 1 (*do not agree*) to 5 (*agree very*
773 *much*). The IAL was administered at three time points (at the beginning of the first data collection
774 wave, end of the first data collection wave, and end of the second data collection wave). We first
775 created a mean per time point per participant. The average reliability for the three trait assessments was

⁴ Please see the codebook on the OSF (<https://osf.io/6kzx3/>) or Supplement A for the exact wording of the questions and response options.

776 high ($\omega = .93$). We then averaged across all available time points for every participant to obtain the
777 most reliable estimate.

778 *State Measures*

779 **Positive Affect.** The dependent variable was assessed as part of the ESM surveys. Both
780 versions of the ESM survey (i.e., social interaction and individual activity) comprised 14 items relating
781 to participants' emotional states. The item stem read either "How did you feel directly after the
782 interaction?" or "How did you feel directly after the activity?" Two items were averaged to indicate
783 positive affect: enthusiastic and pleased. *Enthusiastic* was rated using a 6-point rating scale ranging
784 from 1 (*do not agree at all*) to 6 (*agree completely*). *Pleased* was rated using a slider ranging from 0 to
785 100. The two variables were standardized and then averaged per time point per participant.

786 **Social Interaction.** Participants first indicated whether they had engaged in a social interaction
787 (> 5 min) since the last assessment. This item was dummy coded to indicate the presence (1) vs.
788 absence (0) of social interactions. If answered affirmatively, participants next provided information on
789 several characteristics of the social context.

790 **Communication Channel.** The item for communication channel read: "The interaction
791 evaluated here took place as follows:" and the answer options were 1 (*directly/face-to-face*) or 2 (*via*
792 *phone/chat*).

793 **Interaction Partner.** Participants indicated what role their interaction partner had in relation to
794 themselves for up to five different interaction partners. If participants interacted with more than five
795 people, they were asked to refer to the five people with whom they interacted most via 11 response
796 options. These response options were collapsed into five categories: family (*my child, parent, sibling,*
797 *other relatives*), friends (*friend/acquaintance*), partner (*partner*), work contacts (*supervisor, my*
798 *employee, co-worker, customer/client/patient*), and others (*other persons*).

799 **Regulation Stringency.** We used the same stringency index as described in Study 1. For every
800 survey, we determined the stringency value on the day on which the survey was completed in
801 Germany.

802 *Analytical Strategy*

803 **Study-Specific Analytical Strategy for Study 2.** In Study 2, we estimated the same six models
804 as in Study 1 (see Figures 1 and 2, for formulas, see Table A1 in the Appendix) but included both
805 between- and within-person effects, which is admissible for these data due to the larger number of
806 assessments per person. Thus, in addition to modeling individuals' within-person *average* well-being
807 across the measured time points, we also modeled momentary fluctuations in well-being at specific
808 time points. In all the models that included moderation effects, we estimated between-person
809 interactions (as in Study 1) and cross-level interactions (e.g., the effect of extraversion on people's
810 within-person associations between social interactions and well-being), using the random coefficient
811 prediction method (Preacher et al., 2016). Similarly, in the (moderated) mediation models, we
812 estimated between- and within-person indirect effects as well as between- and within-person moderated
813 mediation effects (Preacher et al., 2007, 2011).

814 As recommended by Asparouhov and Muthén (2019), we used latent centering for the binary
815 social interaction variable. Specifically, we assumed a continuous latent variable M_{ti}^* that translated
816 into the observed values of M_{ti} via a threshold mechanism. We then used the latent between- and
817 within-person components of M_{ti}^* as predictor and outcome variables in multilevel logistic regressions.
818 Because we estimated all the relationships on the continuous scale of the latent variable M_{ti}^* , the
819 indirect effects could be derived by using the same formulas that apply to continuous variables
820 (Muthén et al., 2017).

821 **Exploratory Analyses: Zooming In On the Social Situation and the Person.** As part of our
822 exploratory analyses, we zoomed in on different types of social interactions. To this end, we replaced

823 the binary social interaction variable with (a) one of two dummy-coded variables that reflected FtF
824 interactions versus no social interaction and computer-mediated interactions versus no social
825 interaction, respectively, and (b) one of five dummy-coded variables that reflected interactions with
826 one of five interaction partners (family, friends, partner, work contacts, others) versus no social
827 interaction, respectively. The effects of different communication channels and interaction partners were
828 estimated in separate models (i.e., two models for communication channel, five models for interaction
829 partner) to ensure that the reference category in the multilevel probit regression (path *a*) was the same
830 as in the multilevel linear regression (path *b*). Path *a* reflected whether the frequency of social
831 interactions occurring in physical versus digital contexts or with a given partner increased or decreased
832 as the regulations became stricter. Path *b* indicated whether interacting in physical versus digital
833 contexts or with a given partner was beneficial for well-being compared with no social interaction.
834 Because we used the same reference category in all models, we could compare the strengths of effects
835 across models. We also explored the effects of different extraversion facets (i.e., sociability,
836 assertiveness).

837 **Robustness Analyses.** Similar to Study 1, we ran several robustness analyses. We (a) tested the
838 effects for both well-being adjectives (i.e., enthusiasm, pleasure) separately, (b) replaced the
839 continuous regulation stringency variable with a dummy variable (i.e., 0 = *no lockdown*, 1 = *lockdown*),
840 and (c) added control variables to the main models. Specifically, we controlled for demographic
841 variables (gender was dummy-coded, age was centered at the grand mean) and the effect of weekday
842 (0) versus weekend (1) to capture time trends in the data. In addition, we reran the main models among
843 participants who participated twice (i.e., both before and during the lockdown) to check whether a
844 variance restriction in regulation stringency (among participants who participated only once) might
845 have biased the estimates. Finally, as suggested by a reviewer, we also reran the main models for other
846 Big Five traits (i.e., agreeableness and neuroticism).

847 **Deviations From the Preregistration.** In addition to the deviations described for Study 1, we
848 decided to run analyses on one combined data set for the student sample (Study 2) and one combined
849 data set for the sample from the general population (Study 3), instead of analyzing the subsamples that
850 were collected before and during or during and after the lockdown separately. Combining the data sets
851 collected during different phases of the pandemic allowed us to obtain statistical estimates for the
852 effects of regulation stringency (instead of descriptively comparing the sizes of the coefficients).
853 Because we used the continuous regulation stringency variable, we could analyze all the available data
854 and did not have to create separate data sets with data collected before and during the lockdown,
855 respectively.

856 **Results and Discussion**

857 Descriptive statistics for all focal variables are presented in Table S2 (Supplement A;
858 <https://osf.io/y726z/>). An overview of the results from the six main models (depicted in Figures 1 and
859 2) is presented in Table 1 (third column).

860 *Effects of Extraversion*

861 **Main Effect on Well-Being.** Extraversion (and its facet sociability) were positively associated
862 with positive affect (Tables 1 and S4, Model 1, path *cb*).

863 **Social Participation.** In line with the social participation hypothesis, the relationship between
864 extraversion and positive affect was mediated by social interactions (Table 1, Model 2), suggesting that
865 more extraverted individuals felt better than more introverted individuals in part because they
866 interacted more often. However, similar to Study 1, the indirect effect of extraversion on positive affect
867 via social interactions ($b_{ab} = 0.019, p = .001$) was small compared with the direct effect ($b_{c'} = 0.087, p$
868 $= .002$). When zooming in on different facets of extraversion and different types of social interactions,
869 we found that the social participation hypothesis was supported only for sociability but not for

870 assertiveness (Table S4, Model 2) and only for FtF interactions but not for computer-mediated
871 interactions (Table 4, Model 2).

872 **Social Reactivity.** Contrary to the social reactivity hypothesis, extraversion moderated neither
873 the between- nor the within-person effect of social interactions on positive affect (Table 1, Model 3,
874 paths *bb3* and *bw3*) when we considered a broad extraversion measure. When zooming in on different
875 facets of extraversion, however, we found that sociability moderated the within-person effect of social
876 interactions on positive affect (Table S4, Model 3, path *bw3*), such that more sociable individuals
877 profited more from social interactions than more introverted individuals. In addition, more extraverted
878 individuals profited more from interactions with friends than more introverted individuals (Table 4,
879 Model 3, path *bw3*).

880 **Table 4**

881 *Exploratory Analyses: Zooming In On the Communication Channel and Interaction Partner (Study 2)*

Models	Path	Face-to-face	Computer-mediated	Family	Friends
Model 2: Social participation					
Extraversion → social interactions	ab	0.105 [0.024, 0.186], p < .001	0.068 [-0.031, 0.166], p = .038	0.061 [-0.059, 0.181], p = .093	0.108 [0.016, 0.201], p = .001
Social interactions → well-being	bb	0.243 [0.090, 0.398], p < .001	0.062 [-0.089, 0.215], p = .146	0.151 [0.041, 0.262], p < .001	0.097 [-0.049, 0.244], p = .042
Extraversion → well-being	c'b	0.077 [0.001, 0.153], p = .005	0.089 [0.007, 0.170], p = .003	0.071 [-0.007, 0.149], p = .009	0.099 [0.019, 0.178], p = .001
Indirect effect		0.025 [0.005, 0.057], p < .001	0.003 [-0.008, 0.022], p = .174	0.009 [-0.010, 0.033], p = .093	0.010 [-0.006, 0.034], p = .043
Model 3: Social reactivity					
Extraversion × Social Interactions → well-being	bb3	-0.055 [-0.199, 0.085], p = .158	0.059 [-0.091, 0.208], p = .149	-0.041 [-0.146, 0.068], p = .162	-0.016 [-0.136, 0.109], p = .375
	bw3	0.034 [-0.005, 0.072], p = .013	0.028 [-0.030, 0.093], p = .105	0.030 [-0.021, 0.080], p = .063	0.048 [0.009, 0.090], p = .002
Model 5: Social participation with regulation stringency					
Stringency → social interactions	ab1	0.178 [-0.277, 0.634], p = .156	0.733 [0.215, 1.253], p < .001	1.289 [0.685, 1.897], p < .001	-0.399 [-0.914, 0.116], p = .023
	aw1	-0.157 [-0.343, 0.024], p = .013	0.394 [0.197, 0.589], p < .001	0.632 [0.389, 0.877], p < .001	-0.791 [-0.993, -0.597], p < .001
Social interactions → well-being	bb	0.237 [0.086, 0.389], p < .001	0.040 [-0.117, 0.196], p = .254	0.145 [0.029, 0.260], p = .001	0.137 [-0.006, 0.285], p = .007
	bw	0.161 [0.122, 0.201], p < .001	0.182 [0.126, 0.237], p < .001	0.102 [0.049, 0.154], p < .001	0.262 [0.222, 0.301], p < .001
Stringency → well-being	c'b1	0.118 [-0.286, 0.518], p = .224	0.435 [0.007, 0.863], p = .004	0.069 [-0.358, 0.493], p = .338	0.425 [-0.004, 0.852], p = .005
	c'w1	0.055 [-0.047, 0.156], p = .082	0.258 [0.138, 0.377], p < .001	0.181 [0.063, 0.297], p < .001	0.330 [0.211, 0.450], p < .001
Indirect effect		0.040 [-0.069, 0.175], p = .156	0.027 [-0.094, 0.168], p = .254	0.182 [0.035, 0.387], p = .001	-0.050 [-0.180, 0.017], p = .030
		0.003 [-0.054, 0.060], p = .451	0.086 [0.010, 0.168], p = .002	0.035 [-0.060, 0.129], p = .168	-0.181 [-0.259, -0.111], p < .001
Extraversion × Stringency → social interactions	ab3	-0.133 [-0.593, 0.325], p = .225	0.062 [-0.476, 0.594], p = .381	0.102 [-0.520, 0.722], p = .335	-0.225 [-0.751, 0.298], p = .134
	aw3	-0.037 [-0.220, 0.147], p = .301	-0.034 [-0.231, 0.161], p = .326	-0.076 [-0.321, 0.169], p = .211	0.026 [-0.179, 0.231], p = .372
Moderated mediation effect		-0.029 [-0.161, 0.082], p = .225	0.001 [-0.046, 0.061], p = .442	0.013 [-0.085, 0.125], p = .336	-0.027 [-0.141, 0.047], p = .139
		-0.006 [-0.036, 0.024], p = .301	-0.006 [-0.044, 0.030], p = .326	-0.007 [-0.036, 0.018], p = .211	0.007 [-0.047, 0.061], p = .372
Model 6: Social reactivity with regulation stringency					
Extraversion × Social Interactions → well-being	bb3	-0.051 [-0.192, 0.088], p = .173	0.049 [-0.092, 0.191], p = .180	-0.044 [-0.148, 0.059], p = .138	-0.008 [-0.132, 0.113], p = .434
	bw3	0.033 [-0.006, 0.072], p = .014	0.030 [-0.030, 0.096], p = .106	0.028 [-0.024, 0.080], p = .081	0.044 [0.003, 0.087], p = .003
Moderated mediation effect		-0.006 [-0.071, 0.029], p = .268	0.033 [-0.070, 0.164], p = .181	-0.054 [-0.205, 0.078], p = .138	0.002 [-0.059, 0.071], p = .437
		-0.005 [-0.017, 0.001], p = .027	0.011 [-0.012, 0.042], p = .106	0.017 [-0.015, 0.055], p = .081	-0.034 [-0.072, -0.003], p = .003
			Partner	Work contacts	Others
Model 2: Social participation					
Extraversion → social interactions	ab	0.250 [-0.024, 0.535], p = .010	0.142 [0.032, 0.252], p < .001	0.057 [-0.040, 0.154], p = .064	
Social interactions → well-being	bb	0.073 [0.019, 0.129], p < .001	0.053 [-0.097, 0.204], p = .178	-0.003 [-0.200, 0.195], p = .482	
Extraversion → well-being	c'b	0.073 [-0.007, 0.154], p = .009	0.066 [-0.016, 0.150], p = .019	0.077 [-0.004, 0.157], p = .007	
Indirect effect		0.017 [-0.002, 0.048], p = .010	0.007 [-0.016, 0.034], p = .178	0.000 [-0.018, 0.017], p = .486	
Model 3: Social reactivity					
Extraversion × Social Interactions → well-being	bb3	0.007 [-0.043, 0.055], p = .350	-0.013 [-0.157, 0.130], p = .406	0.104 [-0.119, 0.329], p = .112	
	bw3	0.009 [-0.052, 0.077], p = .347	0.070 [-0.008, 0.139], p = .009	0.066 [-0.016, 0.144], p = .017	
Model 5: Social participation with regulation stringency					

Stringency → social interactions	ab1	-0.361 [-5.591, 4.693], $p = .364$	-0.938 [-1.565, -0.326], $p < .001$	-0.083 [-0.653, 0.479], $p = .352$
	aw1	0.188 [-0.170, 0.527], $p = .081$	-0.746 [-1.039, -0.467], $p < .001$	-0.380 [-0.621, -0.150], $p < .001$
Social interactions → well-being	bb	0.018 [0.003, 0.130], $p < .001$	0.084 [-0.071, 0.239], $p = .081$	0.074 [-0.134, 0.286], $p = .180$
	bw	0.184 [0.118, 0.245], $p < .001$	0.100 [0.032, 0.166], $p < .001$	0.134 [0.051, 0.212], $p < .001$
Stringency → well-being	c'b1	0.437 [0.004, 0.841], $p = .005$	0.347 [-0.105, 0.796], $p = .024$	0.322 [-0.108, 0.751], $p = .026$
	c'w1	0.186 [0.059, 0.314], $p < .001$	0.335 [0.192, 0.479], $p < .001$	0.342 [0.199, 0.489], $p < .001$
Indirect effect		-0.010 [-0.179, 0.108], $p = .364$	-0.074 [-0.263, 0.070], $p = .081$	-0.002 [-0.094, 0.071], $p = .418$
		0.114 [0.004, 0.237], $p = .004$	-0.019 [-0.142, 0.104], $p = .336$	-0.027 [-0.145, 0.090], $p = .275$
Extraversion × Stringency → social interactions	ab3	0.681 [-4.536, 5.678], $p = .273$	0.229 [-0.400, 0.865], $p = .173$	-0.099 [-0.681, 0.498], $p = .330$
	aw3	-0.011 [-0.347, 0.330], $p = .466$	-0.085 [-0.373, 0.200], $p = .219$	-0.034 [-0.260, 0.189], $p = .344$
Moderated mediation effect		0.020 [-0.077, 0.217], $p = .273$	0.013 [-0.049, 0.123], $p = .227$	-0.004 [-0.111, 0.062], $p = .371$
		-0.002 [-0.066, 0.062], $p = .466$	-0.008 [-0.043, 0.022], $p = .219$	-0.004 [-0.038, 0.028], $p = .344$

Model 6: Social reactivity with regulation stringency

Extraversion × Social Interactions → well-being	bb3	0.010 [-0.043, 0.061], $p = .313$	-0.020 [-0.171, 0.120], $p = .357$	0.067 [-0.144, 0.283], $p = .206$
	bw3	0.023 [-0.045, 0.101], $p = .200$	0.047 [-0.031, 0.123], $p = .064$	0.015 [-0.069, 0.097], $p = .323$
Moderated mediation effect		0.000 [-0.044, 0.043], $p = .494$	0.016 [-0.113, 0.168], $p = .357$	-0.001 [-0.087, 0.067], $p = .429$
		0.003 [-0.012, 0.029], $p = .244$	-0.034 [-0.099, 0.024], $p = .064$	-0.005 [-0.040, 0.029], $p = .323$

Note. Unstandardized coefficients with 99% credibility intervals and one tailed p -values are presented. Only coefficients that are relevant for testing the hypotheses are shown in the manuscript. Full models can

882

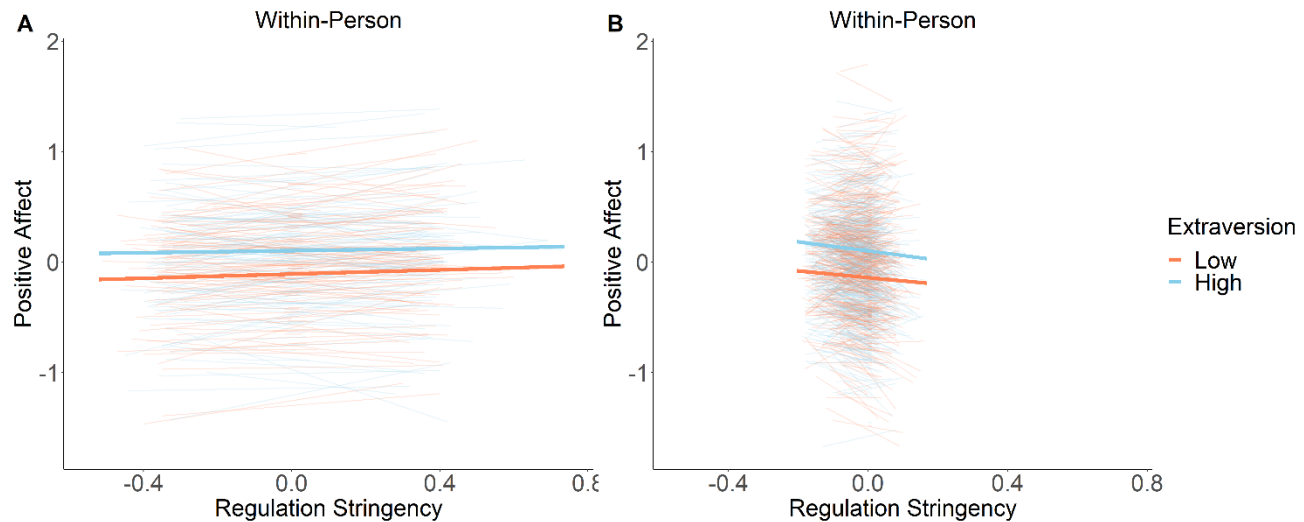
883

be found in Supplement B. All models were estimated with the Bayesian estimator with uninformative priors. Coefficients that are significant at $p < .005$ are printed in bold.

884 *Effects of Social Restrictions*

885 **Quasi-Experimental Manipulation Check.** In Study 2, the within-person means of regulation
886 stringency ranged from 0 to 76.85 ($M = 29.95$). The average person-specific Level 1 stringency
887 variable ranged from -22.88 to 26.36. As a quasi-experimental manipulation check, we first examined
888 the effects of regulation stringency on social interactions. As in Study 1, regulation stringency was
889 unrelated to social interactions when different types of social interactions were combined (within and
890 between persons; Table 1, Model 5, paths *abl* and *awl*). However, we observed a changed
891 socialization pattern when we zoomed in on the specific types of social interactions: Regulation
892 stringency had negative effects on interactions with work contacts (within and between persons) as well
893 as interactions with friends and other interaction partners (only within persons) but positive effects on
894 computer-mediated interactions and interactions with family (within and between persons; Table 4,
895 Model 5, paths *abl* and *awl*).

896 **Extraversion as a Moderator of the Regulation Stringency–Well-Being Relationship.** In
897 Study 2, regulation stringency was not related to positive affect (Table 1, Model 4). At the between-
898 person level, individuals who participated in periods with higher average regulation stringency did not
899 report less positive affect than those who participated in periods with lower average regulation
900 stringency (path *cb1*). At the within-person level, positive affect did not decrease as the regulations
901 became stricter (path *cw1*). Moreover, extraversion (and its facets) moderated neither the between- nor
902 the within-person effect of regulation stringency on positive affect (Tables 1 and S4, Model 4, paths
903 *cb3* and *cw3*). As shown in Figure 4 (Panel a), we observed large variability in person-specific slopes,
904 but this variability was not significantly related to extraversion.

905 **Figure 4**906 *Within-Person Changes in Positive Affect as a Function of Regulation Stringency and Extraversion*907 *(Studies 2 and 3)*

908

909 *Note.* Within-person effect of regulation stringency on positive affect in (a) Study 2 and (b) Study 3.

910 Each line represents data from one participant. Lines are colored according to participants' extraversion

911 levels (based on a median split). The solid blue (light gray) line depicts the predicted slope for

912 participants with an extraversion score 1 *SD* above the mean; the solid orange (dark gray) line refers to913 extraversion 1 *SD* below the mean.

914

915 **Social Participation With Regulation Stringency.** Next, we investigated whether the

916 relationship between regulation stringency and positive affect was mediated by reduced social

917 interactions and whether extraversion (and its facets) moderated path *a* of this effect (Tables 1 and S4,918 Model 5). As in Study 1, social interactions were not related to regulation stringency (paths *ab1* and919 *aw1*) and therefore could not mediate the effect of regulation stringency on positive affect. Moreover,

920 extraversion (and its facets) moderated neither the between- nor the within-person effect of regulation

921 stringency on social interactions (paths *ab3* and *aw3*), indicating that more extraverted individuals did

922 not experience stronger (or weaker) reductions in social participation than more introverted individuals.

923 We also examined whether COVID-19-related changes in communication channels and
924 interaction partners were associated with changes in positive affect (Table 4, Model 5). The pattern was
925 similar to the one observed in Study 1. At the within-person level, interactions with friends decreased
926 on days with higher regulation stringency, which was related to lower positive affect on these days
927 (negative indirect effect). At the same time, computer-mediated interactions and interactions with
928 romantic partners increased, which was related to higher positive affect (positive indirect effects). At
929 the between-person level, individuals who participated in periods with higher average regulation
930 stringency spent comparatively more time with family, which was related to higher well-being levels
931 (positive indirect effect). As in Study 1, the social changes were unrelated to extraversion and thus
932 similar for individuals with high and low extraversion (paths *ab3* and *aw3*). As a result, the indirect
933 effects described above were not moderated by extraversion (no moderated mediation effects).

934 **Social Reactivity With Regulation Stringency.** Comparatively stronger social reactivity in
935 more sociable individuals did not lead to stronger decreases in positive affect during the COVID-19
936 pandemic because the effect of regulation stringency on social interactions was not significant (Table
937 S4, Model 6). However, when zooming in on interaction partners, we found that, compared with more
938 introverted individuals, more extraverted individuals' stronger reactivity to interactions with friends
939 was related to stronger decreases in positive affect during the pandemic (Table 4, Model 6).

940 ***Robustness Analyses***

941 To check for the robustness of the results (see Supplement B), we first repeated the analyses for
942 the two well-being adjectives (enthusiastic, pleased) separately. Whereas social participation effects
943 were similar for the two adjectives, social reactivity effects were supported only for enthusiasm but not
944 for pleasure. Specifically, extraversion significantly moderated the within-person effect of social
945 interactions on enthusiasm, such that more extraverted individuals felt comparatively more enthusiastic
946 after social interactions. However, extraversion did not moderate the between- or within-person effect

947 of social interactions on pleasure. When we used a dichotomous lockdown variable instead of the
948 continuous stringency index, the results did not change substantially. When we included control
949 variables or analyzed a subset of the most compliant participants, the social participation effect was no
950 longer significant. Other Big Five traits (i.e., agreeableness and neuroticism) were also related to well-
951 being, but these associations could not be explained by social interactions (see Supplement A).
952 Moreover, similar to Study 1, these traits did not moderate the effect of regulation stringency on well-
953 being.

954 *Summary*

955 In Study 2, we again found a positive relationship between extraversion and well-being during
956 the pandemic, particularly for the facet of sociability. Moreover, our results supported the social
957 participation hypothesis: More extraverted individuals engaged in social interactions more frequently
958 than more introverted individuals, which was related to higher levels of positive affect. This effect was
959 particularly strong for individuals with high sociability and for FtF interactions. The social reactivity
960 hypothesis was not supported for broad measures of extraversion, social interactions, or positive affect.
961 However, we found significant social reactivity effects at the within-person level for (a) the sociability
962 facet, (b) interactions with friends, and (c) a measure of activated positive affect (enthusiastic) instead
963 of merely pleasurable affect.

964 As opposed to Study 1, we found no effect of regulation stringency on well-being, meaning that
965 well-being did not decrease (or increase) as the regulations became stricter. Moreover, this effect was
966 not related to extraversion, suggesting that more extraverted individuals did not suffer more. As in
967 Study 1, we observed changes in communication channels and interaction partners, which had
968 opposing effects on well-being. Specifically, at the within-person level, interactions with friends
969 decreased, which was related to lower positive affect, whereas computer-mediated interactions and
970 interactions with romantic partners increased, which was related to higher positive affect. In addition,

971 individuals who participated in periods with higher regulation stringency had more interactions with
972 family, which was related to higher well-being levels. However, the social changes associated with the
973 pandemic were unrelated to extraversion and were therefore similar for individuals with high and low
974 extraversion. Moreover, more extraverted individuals did not react more strongly to these changes than
975 more introverted individuals, except for the lack of interactions with friends.

976 **Study 3**

977 In Study 3, we aimed to test whether our findings generalized to a sample from the general
978 population and to different phases of the pandemic (i.e., *during* and *after* the lockdown).

979 **Method**

980 ***Participants***

981 Participants were 1,381 individuals from the general population. A total of 990 individuals
982 (79% female; $M_{\text{age}} = 35.83$ years, $SD_{\text{age}} = 13.38$ years) participated in the first data collection wave
983 (*during* the lockdown), and 660 individuals (83% female; $M_{\text{age}} = 42.00$ years, $SD_{\text{age}} = 12.54$ years)
984 participated in the second data collection wave (*after* the lockdown). Of these, 269 individuals
985 participated in both waves (i.e., *during* and *after* the lockdown). The sample was highly educated and
986 professionally active: Most participants held a university degree (51%) or German Abitur (32%) and
987 were either working (59%) or studying at a university (26%).

988 Participants were recruited via a press release by the University of Münster and online
989 advertisements. As in Study 2, all participants received feedback on their affective well-being to
990 compensate them for their time.

991 ***Procedures***

992 Similar to Study 2, each of the two data collection waves in Study 3 consisted of an initial
993 online survey, a 14-day ESM phase, and a final online survey. Compared with Study 2, some
994 questionnaires were different (see below). Moreover, the two studies differed in which phases of the

995 pandemic they covered: Whereas Study 2 covered periods *before* and *during* the lockdown, Study 3
996 comprised data collection waves that took place *during* and *after* the lockdown. Specifically, the first
997 data collection wave for Study 3 began on March 18, shortly after the announcement of the first
998 nationwide regulations in Germany. The second data collection wave for Study 3 began in mid-May,
999 when the restrictions were first loosened, and the number of daily new infections had decreased
1000 markedly. Besides the changes in questionnaires and pandemic phases, the procedures were identical to
1001 the ones followed in Study 2. All procedures used in this study were approved by the review board of
1002 the University of Münster.

1003 ***Data Cleaning***

1004 We applied the same data cleaning steps as in Study 2. A total of 905 participants were removed
1005 because they completed fewer than 10 surveys. After data cleaning, the average participant completed
1006 45 surveys in total.

1007 ***Trait Measures***

1008 Means and standard deviations for all measures can be found in the descriptive statistics table
1009 (Table S3) in Supplement A.

1010 **Demographic Information.** In addition to age and gender, participants indicated their
1011 occupational and educational status. Moreover, we asked for participants' relationship status and living
1012 situation,⁵ as this information might be particularly relevant during the COVID-19 pandemic. Note that
1013 some participants provided demographic information twice (e.g., in the initial online surveys of both
1014 data collection waves). We considered only the first assessment for each person.

1015 **Extraversion.** Extraversion was measured with the German version of the BFI-2-S (Rammstedt
1016 et al., 2020). The extraversion subscale comprises a total of six items with the item stem "I am

⁵ Please see the codebook on the OSF (<https://osf.io/6kzx3/>) or Supplement A for the exact wording of the questions and response options.

1017 someone who.” Two items tap into the facets of sociability (“tends to be quiet” [reverse-coded]; “is
1018 outgoing, sociable”), assertiveness (“is dominant, acts as a leader”; “prefers to have others take charge”
1019 [reverse-coded]), and energy level (“is full of energy”; “is less active than other people” [reverse-
1020 coded]), respectively. The items were rated using 5-point rating scales ranging from 1 (*disagree*
1021 *strongly*) to 5 (*agree strongly*). The BFI-2-S was administered at the beginning and end of the first and
1022 second data collection waves, respectively. As in Study 2, we first created a mean per time point per
1023 participant. The average reliability for the four trait assessments was good ($\omega = .73$). We again averaged
1024 across all available assessments for every participant to obtain the most reliable estimate.

1025 *State Measures*

1026 All state measures were the same as in Study 2. This regards the item wordings as well as the
1027 response formats.

1028 *Analytical Strategy*

1029 **Study-Specific Analytical Strategy for Study 3.** We ran the same models as in Study 2. Given
1030 the broader extraversion measure applied in Study 3, we could examine the effects of three facets (i.e.,
1031 sociability, assertiveness, energy level) instead of just the two (sociability, assertiveness) from Study 2.

1032 **Robustness Analyses.** We conducted the same robustness analyses as in Study 2 and extended
1033 them by adding more control variables (i.e., educational status, occupational status, relationship status,
1034 living situation) and Big Five traits (i.e., conscientiousness and openness). Finally, as described above,
1035 we estimated the main models in a pooled data set that contained data from Studies 2 and 3.

1036 **Results and Discussion**

1037 Descriptive statistics for all focal variables are presented in Table S3 (Supplement A;
1038 <https://osf.io/y726z/>). An overview of the results from the six main models (depicted in Figures 1 and
1039 2) is presented in Table 1 (fourth column).

1040 *Effects of Extraversion*

1041 **Main Effect on Well-Being.** As depicted in Tables 1 and S4 (Model 1), extraversion (and its
1042 facets) were positively related to positive affect (path cb).

1043 **Social Participation.** In Study 3, the social participation effect just failed to reach significance
1044 (Table 1, Model 2; $b_{ab} = 0.011, p = .005$; $b_{c'} = 0.109, p < .001$). When zooming in on the different
1045 facets of extraversion (Table S4, Model 2) and different types of social interactions (Table 5, Model 2),
1046 we found that social participation effects were (a) significant only for sociability and assertiveness but
1047 not for energy level and (b) significant only for FtF interactions and interactions with friends but not
1048 for other types of interactions.

1049 **Social Reactivity.** Extraversion moderated neither the between- nor the within-person effects of
1050 (any types of) social interactions on positive affect (Tables 1 and 5, Model 3, paths $bb3$ and $bw3$).
1051 However, similar to Study 2, sociability moderated the within-person effect of social interactions on
1052 positive affect (Table S4, Model 3, path $bw3$), indicating that more sociable individuals benefitted more
1053 from social interactions than more introverted individuals.

1054 **Table 5**

1055 *Exploratory Analyses: Zooming In On the Communication Channel and Interaction Partner (Study 3)*

Models	Path	Face-to-face	Computer-mediated	Family	Friends						
Model 2: Social participation											
Extraversion → social interactions	ab	0.164 [0.111, 0.216], p < .001	0.177 [0.124, 0.232], p < .001	0.167 [0.092, 0.242], p < .001	0.208 [0.149, 0.267], p < .001						
Social interactions → well-being	bb	0.078 [0.018, 0.139], p < .001	0.004 [-0.068, 0.076], p = .449	0.043 [-0.003, 0.088], p = .009	0.122 [0.054, 0.192], p < .001						
Extraversion → well-being	c'b	0.103 [0.063, 0.144], p < .001	0.119 [0.076, 0.162], p < .001	0.105 [0.064, 0.147], p < .001	0.112 [0.068, 0.155], p < .001						
Indirect effect		0.013 [0.003, 0.025], p < .001	0.001 [-0.012, 0.014], p = .449	0.007 [-0.001, 0.017], p = .009	0.025 [0.011, 0.043], p < .001						
Model 3: Social reactivity											
Extraversion × Social Interactions → well-being	bb3	-0.002 [-0.060, 0.057], p = .463	0.030 [-0.040, 0.100], p = .133	0.007 [-0.039, 0.049], p = .345	0.027 [-0.045, 0.097], p = .167						
	bw3	0.009 [-0.014, 0.032], p = .147	0.027 [-0.001, 0.055], p = .006	0.018 [-0.012, 0.049], p = .059	0.013 [-0.019, 0.044], p = .143						
Model 5: Social participation with regulation stringency											
Stringency → social interactions	ab1	-1.597 [-2.706, -0.496], p < .001	1.132 [-0.028, 2.299], p = .006	-0.890 [-2.420, 0.645], p = .068	-1.022 [-2.278, 0.234], p = .018						
	aw1	-0.538 [-0.937, -0.135], p < .001	0.725 [0.224, 1.236], p < .001	-0.023 [-0.506, 0.466], p = .451	-0.353 [-0.852, 0.146], p = .034						
Social interactions → well-being	bb	0.076 [0.015, 0.137], p = .001	0.005 [-0.068, 0.080], p = .425	0.043 [-0.003, 0.090], p = .008	0.163 [0.090, 0.235], p < .001						
	bw	0.062 [0.039, 0.085], p < .001	0.051 [0.023, 0.078], p < .001	0.058 [0.029, 0.087], p < .001	0.203 [0.171, 0.235], p < .001						
Stringency → well-being	c'b1	-0.371 [-1.199, 0.463], p = .127	0.301 [-0.598, 1.197], p = .194	-0.146 [-1.029, 0.736], p = .334	-0.004 [-0.924, 0.921], p = .495						
	c'w1	-0.344 [-0.626, -0.062], p = .001	-0.174 [-0.506, 0.152], p = .084	-0.203 [-0.524, 0.118], p = .051	-0.110 [-0.467, 0.253], p = .217						
Indirect effect		-0.117 [-0.279, -0.018], p = .001	0.005 [-0.096, 0.114], p = .426	-0.034 [-0.145, 0.031], p = .075	-0.162 [-0.410, 0.037], p = .018						
		-0.012 [-0.144, 0.121], p = .409	0.071 [-0.094, 0.240], p = .135	-0.026 [-0.194, 0.143], p = .347	-0.021 [-0.233, 0.198], p = .401						
Extraversion × Stringency → social interactions	ab3	-0.664 [-1.765, 0.418], p = .058	-0.477 [-1.642, 0.674], p = .142	-1.688 [-3.268, -0.138], p = .003	-1.492 [-2.718, -0.280], p = .001						
	aw3	0.010 [-0.398, 0.417], p = .474	0.025 [-0.488, 0.546], p = .450	0.100 [-0.402, 0.609], p = .305	0.077 [-0.586, 0.423], p = .347						
Moderated mediation effect		-0.047 [-0.169, 0.034], p = .058	-0.001 [-0.071, 0.059], p = .448	-0.068 [-0.207, 0.007], p = .011	-0.237 [-0.501, -0.042], p = .001						
		0.001 [-0.026, 0.027], p = .474	0.001 [-0.027, 0.030], p = .450	0.006 [-0.025, 0.039], p = .305	-0.016 [-0.120, 0.087], p = .347						
Model 6: Social reactivity with regulation stringency											
Extraversion × Social Interactions → well-being	bb3	-0.004 [-0.064, 0.055], p = .425	0.033 [-0.034, 0.101], p = .101	0.009 [-0.036, 0.053], p = .309	0.026 [-0.045, 0.098], p = .173						
	bw3	0.010 [-0.014, 0.033], p = .143	0.029 [0.000, 0.057], p = .004	0.019 [-0.012, 0.050], p = .057	0.016 [-0.015, 0.049], p = .093						
Moderated mediation effect		0.004 [-0.066, 0.077], p = .425	0.036 [-0.043, 0.147], p = .101	-0.002 [-0.049, 0.029], p = .375	-0.010 [-0.093, 0.034], p = .218						
		-0.005 [-0.022, 0.008], p = .143	0.020 [0.000, 0.053], p = .005	0.000 [-0.015, 0.013], p = .444	-0.005 [-0.027, 0.007], p = .121						
<table border="0" style="width:100%; text-align:center;"> <tr> <td></td> <td></td> <td>Partner</td> <td>Work contacts</td> <td>Others</td> <td></td> </tr> </table>								Partner	Work contacts	Others	
		Partner	Work contacts	Others							
Model 2: Social participation											
Extraversion → social interactions	ab	0.305 [0.186, 0.424], p < .001	0.185 [0.105, 0.267], p < .001	0.110 [0.044, 0.176], p < .001							
Social interactions → well-being	bb	0.028 [-0.002, 0.058], p = .007	-0.003 [-0.049, 0.043], p = .431	0.028 [-0.044, 0.101], p = .155							
Extraversion → well-being	c'b	0.094 [0.052, 0.136], p < .001	0.110 [0.067, 0.152], p < .001	0.103 [0.059, 0.147], p < .001							
Indirect effect		0.008 [0.000, 0.020], p = .007	-0.001 [-0.010, 0.009], p = .431	0.003 [-0.005, 0.013], p = .155							
Model 3: Social reactivity											
Extraversion × Social Interactions → well-being	bb3	-0.005 [-0.035, 0.024], p = .316	0.015 [-0.032, 0.061], p = .206	0.065 [-0.014, 0.145], p = .017							
	bw3	-0.019 [-0.054, 0.017], p = .089	0.025 [-0.013, 0.062], p = .044	0.011 [-0.030, 0.051], p = .244							
Model 5: Social participation with regulation stringency											

Stringency → social interactions	ab1	-1.534 [-3.960, 0.902], $p = .052$	-3.262 [-4.967, -1.582], $p < .001$	-4.489 [-5.879, -3.124], $p < .001$
	aw1	-0.070 [-0.600, 0.475], $p = .366$	-0.347 [-1.006, 0.345], $p = .093$	-1.038 [-1.600, -0.462], $p < .001$
Social interactions → well-being	bb	0.033 [0.004, 0.063], $p = .002$	-0.008 [-0.055, 0.040], $p = .335$	0.049 [-0.034, 0.133], $p = .064$
	bw	0.052 [0.017, 0.087], $p < .001$	-0.003 [-0.039, 0.034], $p = .405$	0.049 [0.009, 0.089], $p = .001$
Stringency → well-being	c'b1	-0.024 [-0.922, 0.872], $p = .471$	-0.166 [-1.086, 0.751], $p = .320$	0.321 [-0.724, 1.390], $p = .215$
	c'w1	-0.336 [-0.679, 0.000], $p = .005$	-0.154 [-0.504, 0.200], $p = .130$	-0.137 [-0.520, 0.252], $p = .182$
Indirect effect		-0.047 [-0.173, 0.031], $p = .053$	0.024 [-0.138, 0.199], $p = .335$	-0.218 [-0.630, 0.156], $p = .064$
		0.049 [-0.150, 0.247], $p = .259$	0.002 [-0.248, 0.254], $p = .492$	-0.047 [-0.263, 0.178], $p = .293$
Extraversion × Stringency → social interactions	ab3	0.665 [-1.801, 3.143], $p = .243$	-0.444 [-2.118, 1.244], $p = .246$	-1.046 [-2.391, 0.279], $p = .021$
	aw3	-0.073 [-0.626, 0.488], $p = .368$	0.206 [-0.475, 0.881], $p = .216$	-0.143 [-0.723, 0.438], $p = .261$
Moderated mediation effect		0.019 [-0.067, 0.133], $p = .244$	0.001 [-0.042, 0.064], $p = .416$	-0.044 [-0.211, 0.042], $p = .082$
		-0.004 [-0.038, 0.028], $p = .368$	0.000 [-0.019, 0.015], $p = .441$	-0.006 [-0.043, 0.025], $p = .261$
Model 6: Social reactivity with regulation stringency				
Extraversion × Social Interactions → well-being	bb3	-0.004 [-0.034, 0.025], $p = .349$	0.018 [-0.028, 0.065], $p = .152$	0.073 [-0.005, 0.150], $p = .008$
	bw3	-0.016 [-0.052, 0.021], $p = .137$	0.024 [-0.013, 0.061], $p = .047$	0.011 [-0.031, 0.053], $p = .248$
Moderated mediation effect		0.002 [-0.038, 0.055], $p = .381$	-0.042 [-0.176, 0.069], $p = .152$	-0.237 [-0.530, 0.017], $p = .008$
		0.000 [-0.012, 0.017], $p = .395$	-0.007 [-0.041, 0.010], $p = .118$	-0.011 [-0.061, 0.033], $p = .248$

Note. Unstandardized coefficients with 99% credibility intervals and one tailed p -values are presented. Only coefficients that are relevant for testing the hypotheses are shown in the manuscript. Full models can

be found in Supplement B. All models were estimated with the Bayesian estimator with uninformative priors. Coefficients that are significant at $p < .005$ are printed in bold.

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1058 *Effects of Social Restrictions*

1059 **Quasi-Experimental Manipulation Check.** In Study 3, the within-person means of regulation
1060 stringency ranged from 56.61 to 76.85 ($M = 69.03$). The average person-specific range of the Level 1
1061 stringency variable was from -7.08 to 3.37. As in Study 2, we observed no effect of regulation
1062 stringency on social interactions when we combined the different types of social interactions (within
1063 and between persons; Table 1, Model 5, paths *abl* and *awl*). In addition, we replicated the more
1064 nuanced effects on different types of social interactions that occurred in Studies 1 and 2: Regulation
1065 stringency had negative effects on FtF interactions and interactions with other interaction partners
1066 (within and between persons) as well as interactions with work contacts (only between persons) but
1067 positive effects on computer-mediated interactions (only within persons; Table 5, Model 5, paths *abl*
1068 and *awl*).

1069 **Extraversion as a Moderator of the Regulation Stringency–Well-Being Relationship.** In
1070 Study 3, regulation stringency was negatively related to positive affect at the within-person level (Table
1071 1, Model 4, path *cw1*), suggesting that positive affect increased as the restrictions were relaxed.
1072 However, regulation stringency was not related to positive affect at the between-person level (path
1073 *cb1*), indicating that individuals who participated in periods with lower average regulation stringency
1074 did not report more positive affect than those who participated in periods with higher average
1075 regulation stringency. As in Studies 1 and 2, extraversion (and its facets) moderated neither the
1076 between- nor the within-person effect of regulation stringency on positive affect (Tables 1 and S4,
1077 Model 4, paths *cb3* and *cw3*). As shown in Figure 4 (Panel b), the negative relationship between
1078 regulation stringency and positive affect was unrelated to extraversion and was thus similar for
1079 individuals with different levels of extraversion.

1080 **Social Participation With Regulation Stringency.** When we combined the different types of
1081 interactions, social interactions did not mediate the relationship between regulation stringency and

1082 well-being (Table 1, Model 5, no indirect effect). Moreover, more extraverted individuals did not
1083 experience stronger decreases in social participation than their more introverted counterparts (paths *ab3*
1084 and *aw3*), both when we used a general measure (Table 1) and when we used narrower facets (Table
1085 S4).

1086 When zooming in on the social situation (Table 5, Model 5), we found that individuals who
1087 experienced higher regulation stringency on average tended to have comparatively fewer FtF
1088 interactions which was related to lower levels of positive affect (negative indirect effect). Moreover, we
1089 found significant moderation effects at the between-person level for interactions with family and
1090 friends (Table 5, Model 5, path *ab3*). However, the moderated mediation effect was significant only for
1091 interactions with friends, suggesting that the negative indirect effect of regulation stringency on well-
1092 being via social interactions with friends was stronger for more extraverted individuals.

1093 **Social Reactivity With Regulation Stringency.** As in Study 2, stronger social reactivity in
1094 more sociable individuals did not lead to stronger decreases in positive affect in these individuals
1095 because the effect of regulation stringency on social interactions was not significant (Table S4, Model
1096 6). Moreover, our exploratory analyses showed that more extraverted individuals profited
1097 comparatively more from computer-mediated interactions (Table 5, Model 6, path *bw3*), but the
1098 moderated mediation effect just failed to reach significance.

1099 ***Robustness Analyses***

1100 In our robustness analyses (Supplements A and B), we found that the negative between-person
1101 effect of regulation stringency on pleasure (but not on enthusiasm) was more pronounced in more
1102 extraverted individuals than in more introverted individuals. The results did not change substantially
1103 when we used a dichotomous lockdown variable instead of the continuous stringency index, included
1104 control variables, or analyzed a subset of the most compliant participants. As in Study 1, social
1105 interactions were relevant for explaining links between other Big Five traits (i.e., agreeableness and

1106 neuroticism) and well-being, but these indirect effects were much smaller than those observed for
1107 extraversion (see Supplement A). In addition, agreeableness moderated the within-person effect of
1108 social interactions on well-being. However, this effect was observed only in Study 3 and could not be
1109 replicated in the other two studies. None of the other Big Five traits moderated the effect of regulation
1110 stringency on well-being.

1111 *Summary*

1112 As in Studies 1 and 2, extraversion was related to higher well-being. This effect could not be
1113 explained by social interactions when we used broad measures. However, we did find significant
1114 effects when zooming in on the facets of extraversion and more specific types of social interactions:
1115 Social participation effects emerged for the sociability and assertiveness facets as well as for FtF
1116 interactions and interactions with friends. Moreover, we observed significant social reactivity effects at
1117 the within-person level for the sociability facet.

1118 Regarding the effects of social restrictions, we found a negative effect of regulation stringency
1119 on positive affect at the within-person level, indicating that positive affect increased as the regulations
1120 were relaxed. However, this effect was not moderated by extraversion. Similar to Studies 1 and 2, we
1121 observed effects of regulation stringency on specific types of social interactions, which partly affected
1122 well-being. In particular, the lower frequency of FtF interactions among individuals who participated in
1123 periods with higher average regulation stringency was related to lower well-being levels in these
1124 participants. However, extraversion was mostly unrelated to changes in social interaction patterns and
1125 reactivity to these changes when we analyzed all types of social interactions together. A more
1126 differentiated inspection revealed that extraversion moderated the between-person effect of regulation
1127 stringency on interactions with friends, which was related to lower well-being levels.

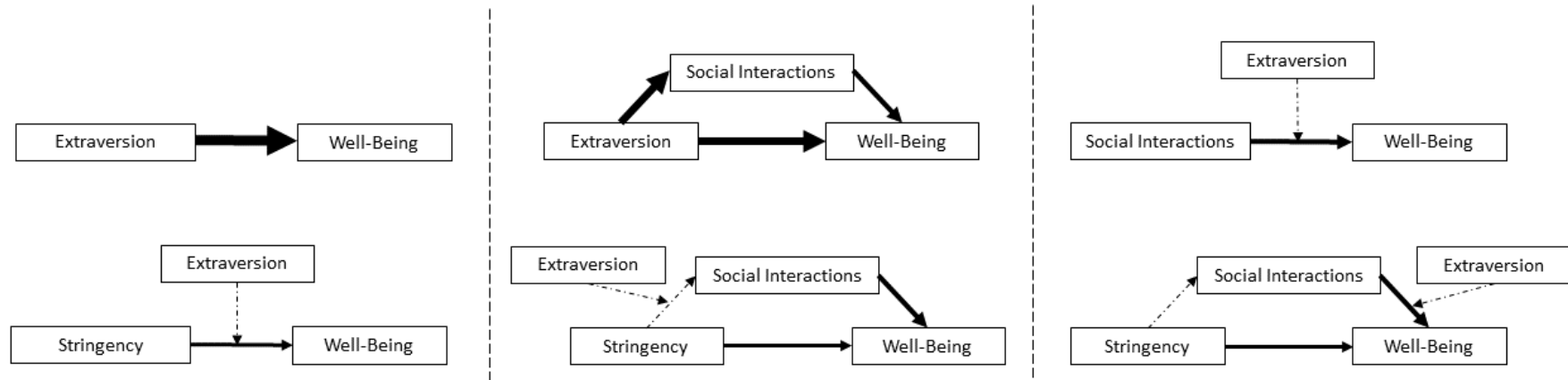
1128

Meta-Analysis

1129 We integrated the standardized effects from all three (between-person effects) or two (within-
1130 person effects) studies using a fixed-effects meta-analysis with the package metafor (Viechtbauer,
1131 2010) in R (R Core Team, 2021). Figure 5 shows an overview of the results. Across all three studies,
1132 extraversion was consistently related to higher well-being levels ($\beta_{cb} = .208, p < .001$). In line with the
1133 social participation hypothesis, we found a small indirect effect of extraversion on well-being via social
1134 interactions ($\beta_{ab} = .027, p < .001$), but most of the association was direct ($\beta_{cI} = .181, p < .001$). The
1135 social reactivity hypothesis was not supported at the between-person level and just failed to reach
1136 significance at the within-person level ($\beta_{bw3} = .081, p = .005$) when we considered broad measures of
1137 extraversion and well-being. However, we observed the theoretically expected social reactivity effects
1138 for specific facets of extraversion (i.e., sociability; $\beta_{bw3} = .143, p < .001$) and well-being (i.e., activated
1139 positive affect; $\beta_{bw3} = .117, p < .001$) at the within-person level.

1140 We observed a small negative effect of regulation stringency on well-being at the between-
1141 person level ($\beta_{cb1} = -.095, p < .001$), but this effect was inconsistent across studies and was not
1142 moderated by extraversion. This finding indicates that individuals with high extraversion did not suffer
1143 more during the pandemic. Moreover, the overall frequency of social interactions did not change during
1144 the pandemic and therefore did not mediate the effect of regulation stringency on well-being. However,
1145 the types of social interactions changed: FtF interactions ($\beta_{ab1} = -.129, \beta_{aw1} = -.033$) and interactions
1146 with friends ($\beta_{ab1} = -.010, \beta_{aw1} = -.084$), work contacts ($\beta_{ab1} = -.131, \beta_{aw1} = -.064$), and other
1147 interaction partners ($\beta_{ab1} = -.291, \beta_{aw1} = -.070$) decreased, whereas online interactions ($\beta_{ab1} = .147,$
1148 $\beta_{aw1} = .060$) and interactions with family ($\beta_{ab1} = .097, \beta_{aw1} = .038$) increased (all $ps < .001$). These
1149 changes triggered opposing mediation pathways: At the within-person level, COVID-19-related
1150 restrictions led to lower well-being because they went along with fewer interactions with friends
1151 (negative indirect effect). However, this effect was partially compensated for because the restrictions
1152 also led to an increase in online interactions (positive indirect effect). Moreover, at the between-person

1153 level, individuals who participated in periods with higher average regulation stringency had fewer FtF
1154 interactions and interactions with friends, which was related to lower well-being levels (negative
1155 indirect effects). However, there was no evidence for the expected social participation or social
1156 reactivity processes during the COVID-19 pandemic: More extraverted individuals did not experience
1157 stronger decreases in social participation during the pandemic, nor did they suffer more from the social
1158 changes.

1159 **Figure 5**1160 *Overview of Findings*

1161

1162 *Note.* The figure is based on a fixed-effects meta-analysis of the standardized estimates from the individual studies (for Study 1, the outcome
 1163 was happiness, for Studies 2 and 3, the outcome was positive affect). The strength of the arrows indicates the sizes of the effects (< .10, .10–
 1164 .15, .15–.20, > .20). All effects reflect between-person effects. Nonsignificant effects are depicted with dashed arrows.

1165

General Discussion

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For decades, it has been assumed that social interactions play a vital role in explaining the link

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between extraversion and well-being (Diener et al., 1984; Lucas et al., 2008; Srivastava et al., 2008).

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Here, we provide evidence from large samples (total $N = 6,296$) during an unprecedented time of

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reduced social contact to further clarify the relationships between extraversion, social interactions, and

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well-being. First, we found some evidence for the social participation hypothesis in that the relationship

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between extraversion and well-being was partly mediated by social interactions but no consistent

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evidence for the social reactivity hypothesis in that extraversion did not moderate the relationship

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between social interactions and well-being when broad measures of extraversion and well-being were

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considered. However, in line with theoretical expectations (see below), significant social reactivity

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effects emerged for specific facets of extraversion and well-being (i.e., the sociability facet and

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measures of activated positive affect). Second, we showed that, despite the social participation and

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social reactivity effects, individuals with comparatively higher extraversion did not react differently to

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involuntary reductions in social interaction frequency and therefore did not suffer more. Below, we

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discuss our findings with regard to theories about extraversion and well-being, effects of the COVID-

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19 pandemic on well-being and social interaction processes, and personality effects during societal

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challenges.

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Revisiting the Social Participation and Social Reactivity Hypotheses

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Owing to our large samples, our analyses had a high power to test the social participation and

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social reactivity hypotheses and thereby offer new insights into the empirical evidence for them. First,

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in line with the social participation hypothesis, we found a small indirect effect of extraversion on well-

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being via social interaction frequency, but most of the association was direct. This finding is in line

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with previous research that found partial mediation effects (Lucas et al., 2008; Oerlemans & Bakker,

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2014; Srivastava et al., 2008). Thus, even though social interaction frequency may be involved in the

1189 link between extraversion and well-being, there must be additional processes that explain why more
1190 extraverted individuals experience higher well-being on average (see below).

1191 Second, we found no consistent evidence for the social reactivity hypothesis for broad measures
1192 of extraversion and well-being and even opposing effects at the between-person level. Specifically, in
1193 Study 1, the between-person relationship between social time and life satisfaction was stronger in more
1194 *introverted* individuals. Interestingly, similar patterns have been reported in other studies. For example,
1195 in Kuper et al. (2022), the between-person relationship of social leisure activities (i.e., evening
1196 socializing and talking to close others) with subjective well-being (i.e., happiness and life satisfaction)
1197 was more pronounced in more introverted individuals. Along with the main effects of extraversion on
1198 social interaction frequency, these findings resemble a pattern of diminishing returns, such that higher
1199 social interaction frequencies among more extraverted individuals are associated with diminishing
1200 well-being benefits (Ren et al., 2022). Note, however, that the between-person interaction was
1201 significant only in Study 1. Moreover, it was limited to cognitive aspects of well-being (i.e., life
1202 satisfaction) and did not generalize to affective well-being in our study. As such, future studies should
1203 test the robustness of this finding across different samples and aspects of well-being.

1204 When zooming in on within-person relationships in Studies 2 and 3, we found that social
1205 reactivity effects may be specific to lower-level facets of extraversion and well-being. These findings
1206 were in line with theoretical expectations: First, in both studies, social reactivity effects were present
1207 for the sociability facet but not for the assertiveness or energy level facets. The sociability facet
1208 captures individual differences in the tendency to seek out social activities (Soto & John, 2017). Thus,
1209 it is conceptually most closely related to the enjoyment of social interactions. Second, in the meta-
1210 analysis, social reactivity effects emerged only for activated positive affect but not for merely pleasant
1211 affect. This finding is in line with previous studies that have shown that extraversion reflects positive
1212 activation rather than pleasant valence (Smillie, DeYoung, et al., 2015). Taken together, these results

1213 underline (a) the need to disentangle between- from within-person effects and (b) the need to consider
1214 lower-level facets of extraversion and well-being to comprehensively understand affective reactivity
1215 processes in daily life (Möttus, 2016; Smillie et al., 2012).

1216 **Theories About Extraversion and Well-Being**

1217 If social interactions are not the (only) reason for the extraversion–well-being relationship, what
1218 other mechanisms might be at play? First, the link between extraversion and well-being might not be
1219 explained (only) by higher social interaction quantity but also by better social interaction *quality* in
1220 individuals with high extraversion (Smillie, Wilt, et al., 2015). For instance, in Harris et al. (2017), the
1221 association between extraversion and subjective well-being was mediated by feelings of social
1222 belonging and social connection (i.e., higher relationship satisfaction). Similarly, Sun et al. (2017)
1223 found that the association between extraversion and well-being was mediated by perceived social
1224 contribution (i.e., the perception of having a positive impact on other people). These findings suggest
1225 that indirect effects of extraversion on well-being via social interactions may be larger when the
1226 qualitative experience of these interactions is considered. Similarly, more extraverted individuals may
1227 react more strongly to specific qualitative aspects of social interactions (e.g., Sun et al., 2020).

1228 Second, in line with instrumental models, the relationship between extraversion and well-being
1229 may be (partly) mediated by additional activities and experiences. Previous research has shown that
1230 more extraverted individuals tend to engage in numerous activities that are associated with higher well-
1231 being. For instance, more extraverted individuals tend to exercise more (Kroencke et al., 2019; Rhodes
1232 & Smith, 2006; Wilson & Dishman, 2015), engage in more cultural activities, and go on more
1233 vacations (Kuper et al., 2022) than more introverted individuals. If all these activities jointly contribute
1234 to higher well-being in more extraverted individuals, the effect of every single activity (e.g., social
1235 interactions) is likely to be small, and only partial mediation effects can be expected. Similarly, more
1236 extraverted individuals may profit comparatively more from other activities beyond social interactions,

1237 such as physical activity (Chan et al., 2018). However, such moderation effects are often small in size
1238 and inconsistent across studies (Kuper et al., 2022).

1239 Finally, the link between extraversion and well-being may be due to neurobiological factors. In
1240 particular, extraversion has been linked to individual differences in the dopaminergic system, which is
1241 thought to regulate reward processing (Depue & Collins, 1999; DeYoung, 2013; Gray, 1987; Wacker
1242 & Smillie, 2015). Specifically, dopamine is thought to regulate the motivation to seek out rewards and
1243 the corresponding feelings of “wanting” or “craving” (Berridge, 2007). Given that many rewards in our
1244 everyday lives are social, the social reactivity effects for activated positive affect reported in our study
1245 are in line with neurobiological reward-processing theories of extraversion (Smillie et al., 2012).

1246 **Effects of the COVID-19 Pandemic on Well-Being and Social Interaction Processes**

1247 Previous studies on the link between the COVID-19 pandemic and well-being have yielded
1248 mixed results. Whereas some studies reported no decreases in well-being during the first COVID-19-
1249 related lockdown in Germany (e.g., Entringer & Gosling, 2022), other studies found that well-being
1250 declined during this period (e.g., Zacher & Rudolph, 2021). A meta-analysis reported that, whereas
1251 mental health symptoms (e.g., depression, anxiety) increased during the first lockdowns in 2020,
1252 positive psychological functioning (including satisfaction with life and positive affect) did not change
1253 significantly, but there was considerable between-study heterogeneity (Prati & Mancini, 2021).
1254 Similarly, in our studies, results varied across samples, as we observed small negative effects in the
1255 samples from the general population in Studies 1 and 3 but no effect in the student sample in Study 2.
1256 Our pattern of findings suggests that students may have been less affected by the first nationwide
1257 lockdowns in 2020 than other populations. This interpretation is in line with a large-scale German daily
1258 diary study that showed that increases in loneliness during this time were stronger for older participants
1259 (Buecker et al., 2020). However, potential differences between subgroups from the population may
1260 have changed over the course of the pandemic (see below).

1261 The small effects we observed in our studies could also be due to factors other than the
1262 regulations. In Studies 2 and 3, well-being increased from January to March and then again from March
1263 to May. These increases may be due to a seasonal effect (Feddersen et al., 2016). Moreover, during the
1264 first data collection phase in January, students were preparing for their exams in February. As such,
1265 performance pressure might have dampened their positive affect compared with the postexam phase in
1266 March—a phase without classes between semesters in which students typically do not meet regularly
1267 based on their schedule. Importantly, if pandemic-related decreases in well-being can be masked by
1268 other everyday phenomena (e.g., weather or exams), the effects on well-being must be very small
1269 compared with the effects of other everyday life experiences. Thus, we found no evidence for the
1270 drastic decreases in well-being that were expected.

1271 When zooming in on the underlying social interaction processes, we found that social
1272 interactions changed in line with the physical distancing regulations. Specifically, interactions with a
1273 high risk of infection that were targeted by the regulations (i.e., FtF interactions and interactions with
1274 individuals from different households, e.g., friends, work contacts, or other interaction partners)
1275 decreased with higher regulation stringency. At the same time, unavoidable interactions or those with a
1276 lower risk of infection (i.e., computer-mediated interactions and interactions with individuals from the
1277 same household, e.g., family members) increased. These changes in social interaction patterns are in
1278 line with another recent study that found that in-person interactions increased from April 2020 (during
1279 the lockdown) to June 2020 (after the lockdown) in Germany, whereas online interactions decreased
1280 (Krämer et al., 2022). Similarly, previous studies reported that the number of work contacts decreased
1281 dramatically during the COVID-19 pandemic, whereas the number of home contacts remained
1282 relatively stable (Tomori et al., 2021). Our mediation analyses showed that these changes were
1283 adaptive for well-being. For instance, whereas negative effects of regulation stringency on FtF

1284 interactions and interactions with friends were related to lower well-being, positive effects on
1285 computer-mediated interactions had a buffering effect on well-being.

1286 **Personality Effects During Societal Challenges**

1287 As described in the Introduction, predictions about personality effects during societal challenges
1288 can be made on the basis of two theoretical arguments. On the one hand, the COVID-19 pandemic
1289 could be conceptualized as a weak situation that allowed for and to some extent provoked the
1290 expression of individual differences due to the ambiguity of novel situations and the lack of clear
1291 behavioral norms (Caspi & Moffitt, 1993). This perspective suggests that extraversion's relationships
1292 with well-being and social interaction frequency should have *increased* during the pandemic. On the
1293 other hand, the pandemic could be conceptualized as a strong situation that should prohibit the
1294 expression of individual differences (Mischel, 1977) due to the governmental restrictions. Thus,
1295 extraversion's relationships with well-being and social interaction frequency should have *decreased*
1296 during the pandemic. The fact that the COVID-19 pandemic could be categorized as either a weak or a
1297 strong situation supports the observation that the situational strength hypothesis can be applied flexibly
1298 and is therefore difficult to falsify (Cooper & Withey, 2009).

1299 In our studies, we found that extraversion's relationships with well-being and social interaction
1300 frequency neither increased nor decreased with more stringent regulations. Thus, none of the
1301 theoretical arguments described above were supported by our data. This finding is in line with other
1302 research that has failed to support the strong situation hypothesis (Cooper & Withey, 2009). Instead, we
1303 found that the effects of personality on social interactions and well-being were robust even in the face
1304 of societal challenges, suggesting that most individuals quickly adapted to the new situation in
1305 accordance with their personality traits.

1306 **Limitations and Future Research**

1307 Our study has several limitations that point to fruitful directions for future research. First, even
1308 though the number of participants was very large, future studies should increase the number of
1309 assessments within participants. For instance, in Study 1, more than half of the participants provided
1310 only one assessment, which made it impossible for us to estimate within-person effects.

1311 Second, some measures in Study 1 were relatively short (e.g., only three items for measuring
1312 extraversion, single items for affective and cognitive well-being). These shorter measures were chosen
1313 intentionally to reduce participant fatigue and increase retention (Bolger et al., 2003). Moreover,
1314 previous research has shown that these measures have sufficient reliability and validity to capture our
1315 key constructs of interest (Cheung & Lucas, 2014; Lucas & Donnellan, 2012; Rammstedt et al., 2020;
1316 Soto & John, 2017), and we observed the expected correlations with the theoretically relevant variables
1317 in our data. Future research could improve the measurement of key constructs by using longer
1318 measures with even better psychometric properties.

1319 Third, as explained above, the physical distancing regulations coincided with other temporal
1320 phenomena, such as seasonal effects or the end of the exam period. With the designs we applied, we
1321 could not fully control for these additional environmental influences. As such, it is unclear whether the
1322 effects reported in the present study could be completely attributed to the regulations. Future studies
1323 should aim to further isolate the effects of the regulations to determine their unique effects.

1324 Fourth, the data were collected in the early phases of the pandemic, for example, around the
1325 first of several waves of COVID-19 in Germany. Thus, our results refer only to short-term
1326 consequences of the pandemic-related restrictions. Future studies should focus on long(er)-term effects
1327 to determine whether the effects become more (or less) pronounced over time.

1328 Fifth, we relied exclusively on self-reports. Previous research has shown that self-reports are a
1329 valid method for assessing highly subjective information, such as well-being (Kuppens et al., 2022).

1330 Other methodological approaches might be worth exploring, particularly when it comes to the

1331 assessment of social interactions. In addition to using ESM self-reports, future studies should include
1332 ESM reports by interaction partners (e.g., Breil et al., 2019, 2022; Geukes et al., 2019) as well as more
1333 objective measures of social contact, such as call, text, or app usage logs (Harari et al., 2020). These
1334 studies could also consider theoretically derived qualitative features of social interactions and how they
1335 are related to extraversion (Back, 2021).

1336 Seventh, future studies might incorporate and model in greater detail the social networks that
1337 participants are embedded in. In the current set of studies, we captured various forms of social
1338 interaction partners and communication channels from the perspective of individual participants.
1339 However, participants' social behaviors and adjustment to social and societal challenges can also be
1340 driven by the structure of their social networks and the social norms of the groups they are part of.
1341 Future studies might analyze these social network dynamics more closely to understand how
1342 extraversion is linked to well-being within larger social networks, such as student cohorts, work
1343 groups, or families (e.g., van Zalk et al., 2020). Such designs also call for more complex statistical
1344 techniques that allow the network structure and social influences within this network to be modeled
1345 (e.g., Meijerink-Bosman et al., 2022; Nestler et al., 2017; Snijders et al., 2010; Stadtfeld & Block,
1346 2017).

1347 Eighth, whereas the hypotheses tested in the present manuscript (i.e., the social participation
1348 and social reactivity hypotheses) refer to the effects of *increased* socialization (i.e., social engagement),
1349 the physical distancing regulations led a period of *decreased* socialization (i.e., social isolation). We
1350 assumed that social engagement and social isolation reflect two ends of the same continuum, but it is
1351 also possible that they are qualitatively different phenomena. Therefore, future studies should
1352 manipulate social engagement and social isolation separately to identify their shared and unique effects.

1353 Finally, generalizability may be limited in our studies. Whereas we moved beyond student
1354 populations in Studies 1 and 3, participants were primarily highly educated in all studies. Moreover,

1355 Study 2 mostly consisted of college students, who are rather overrepresented in psychological research.
1356 In addition, because participation was voluntary, we might have missed the people who suffered the
1357 most. To draw more robust conclusions about the general population, future studies should aim to
1358 increase representativeness.

1359 **Conclusions**

1360 In the present paper, we provided a comprehensive examination of the extraversion–well-being
1361 relationship across diverse samples, methods, and contexts. Our findings underline the robustness of
1362 the effects of extraversion on well-being during a societal crisis. Moreover, we provide new insights
1363 into social participation and social reactivity processes: First, we found some support for the social
1364 participation hypothesis—but not the social reactivity hypothesis—when considering broad measures
1365 of extraversion, social interactions, and well-being. Second, theoretically expected social reactivity
1366 effects emerged for specific facets of extraversion (i.e., sociability) and well-being (i.e., activated
1367 positive affect). Our research highlights the potential of differentiating between different facets of
1368 extraversion and well-being when investigating their dynamic interplay with social interactions.

References

- 1369
1370 Anglim, J., & Horwood, S. (2021). Effect of the COVID-19 pandemic and big five personality on
1371 subjective and psychological well-being. *Social Psychological and Personality Science*, 12(8),
1372 1527–1537. <https://doi.org/10.1177/1948550620983047>
- 1373 Anglim, J., Horwood, S., Smillie, L. D., Marrero, R. J., & Wood, J. K. (2020). Predicting psychological
1374 and subjective well-being from personality: A meta-analysis. *Psychological Bulletin*, 146(4),
1375 279–323. <https://doi.org/10.1037/bul0000226>
- 1376 Arend, M. G., & Schäfer, T. (2019). Statistical power in two-level models: A tutorial based on Monte
1377 Carlo simulation. *Psychological Methods*, 24(1), 1–19. <https://doi.org/10.1037/met0000195>
- 1378 Argyle, M., & Lu, L. (1990). The happiness of extraverts. *Personality and Individual Differences*,
1379 11(10), 1011–1017. [https://doi.org/10.1016/0191-8869\(90\)90128-E](https://doi.org/10.1016/0191-8869(90)90128-E)
- 1380 Arslan, R. C., Walther, M. P., & Tata, C. S. (2020). formr: A study framework allowing for automated
1381 feedback generation and complex longitudinal experience-sampling studies using R. *Behavior*
1382 *Research Methods*, 52, 376–387. <https://doi.org/10.3758/s13428-019-01236-y>
- 1383 Asendorpf, J. B., & Wilpers, S. (1998). Personality effects on social relationships. *Journal of*
1384 *Personality and Social Psychology*, 74(6), 1531–1544. [https://doi.org/10.1037/0022-](https://doi.org/10.1037/0022-3514.74.6.1531)
1385 3514.74.6.1531
- 1386 Asparouhov, T., & Muthén, B. (2019). Latent variable centering of predictors and mediators in
1387 multilevel and time-series models. *Structural Equation Modeling: A Multidisciplinary Journal*,
1388 26(1), 119–142. <https://doi.org/10.1080/10705511.2018.1511375>
- 1389 Back, M. D. (2021). Social interaction processes and personality. In J. Rauthmann (Ed.), *The handbook*
1390 *of personality dynamics and processes* (pp. 183–226): Elsevier.

- 1391 Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as
1392 a fundamental human motivation. *Psychological Bulletin*, *117*(3), 497–529.
1393 <https://doi.org/10.1037/0033-2909.117.3.497>
- 1394 Berridge, K. C. (2007). The debate over dopamine's role in reward: the case for incentive salience.
1395 *Psychopharmacology*, *191*(3), 391-431. <https://doi.org/10.1007/s00213-006-0578-x>
- 1396 Berry, D. S., Willingham, J. K., & Thayer, C. A. (2000). Affect and personality as predictors of conflict
1397 and closeness in young adults' friendships. *Journal of Research in Personality*, *34*(1), 84–107.
1398 <https://doi.org/10.1006/jrpe.1999.2271>
- 1399 Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review*
1400 *of Psychology*, *54*(1), 579-616. <https://doi.org/10.1146/annurev.psych.54.101601.145030>
- 1401 Breil, S. M., Geukes, K., Wilson, R. E., Nestler, S., Vazire, S., & Back, M. D. (2019). Zooming into
1402 real-life extraversion – how personality and situation shape sociability in social interactions.
1403 *Collabra: Psychology*, *5*(1), Article 7. <https://doi.org/10.1525/collabra.170>
- 1404 Breil, S. M., Schweppe, P. C., Geukes, K., Biesanz, J. C., Quintus, M., Wagner, J., Wrzus, C., Nestler,
1405 S., & Back, M. D. (2022). The incremental validity of average states: A replication and
1406 extension of Finnigan and Vazire (2018). *Journal of Personality and Social Psychology*, *123*(3),
1407 e23–e37. <https://doi.org/10.1037/pspp0000408>
- 1408 Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J.
1409 (2020). The psychological impact of quarantine and how to reduce it: rapid review of the
1410 evidence. *The Lancet*, *395*(10227), 912–920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- 1411 Buecker, S., Horstmann, K. T., Krasko, J., Kritzler, S., Terwiel, S., Kaiser, T., & Luhmann, M. (2020).
1412 Changes in daily loneliness for German residents during the first four weeks of the COVID-19
1413 pandemic. *Social Science & Medicine*, *265*, Article 113541.
1414 <https://doi.org/10.1016/j.socscimed.2020.113541>

- 1415 Buijs, V. L., Jeronimus, B. F., Lodder, G. M. A., Riediger, M., Luong, G., & Wrzus, C. (2022).
1416 Interdependencies between family and friends in daily life: Personality differences and
1417 associations with affective well-being across the lifespan. *European Journal of Personality*.
1418 Advance online publication. <https://doi.org/10.1177/08902070211072745>
- 1419 Bundesregierung (2020). *Pressekonferenz von Bundeskanzlerin Merkel zu Maßnahmen der*
1420 *Bundesregierung im Zusammenhang mit dem Coronavirus*.
1421 [https://www.bundesregierung.de/breg-de/aktuelles/pressekonferenz-von-](https://www.bundesregierung.de/breg-de/aktuelles/pressekonferenz-von-bundeskanzlerinmerkel-zu-massnahmender-bundesregierung-im-zusammenhang-mit-dem-coronavirus-1731022)
1422 [bundeskanzlerinmerkel-zu-massnahmender-bundesregierung-im-zusammenhang-mit-dem-](https://www.bundesregierung.de/breg-de/aktuelles/pressekonferenz-von-bundeskanzlerinmerkel-zu-massnahmender-bundesregierung-im-zusammenhang-mit-dem-coronavirus-1731022)
1423 [coronavirus-1731022](https://www.bundesregierung.de/breg-de/aktuelles/pressekonferenz-von-bundeskanzlerinmerkel-zu-massnahmender-bundesregierung-im-zusammenhang-mit-dem-coronavirus-1731022)
- 1424 Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, *61*,
1425 679–704. <https://doi.org/10.1146/annurev.psych.093008.100352>
- 1426 Caspi, A., & Moffitt, T. E. (1993). When do individual differences matter? A paradoxical theory of
1427 personality coherence. *Psychological Inquiry*, *4*(4), 247–271.
1428 https://doi.org/10.1207/s15327965pli0404_1
- 1429 Chan, B. C. L., Luciano, M., & Lee, B. (2018). Interaction of physical activity and personality in the
1430 subjective wellbeing of older adults in Hong Kong and the United Kingdom. *Behavioral*
1431 *Sciences*, *8*(8), Article 71. <https://doi.org/10.3390/bs8080071>
- 1432 Cheung, F., & Lucas, R. E. (2014). Assessing the validity of single-item life satisfaction measures:
1433 Results from three large samples. *Quality of Life Research*, *23*(10), 2809–2818.
1434 <https://doi.org/10.1007/s11136-014-0726-4>
- 1435 Cooper, W. H., & Withey, M. J. (2009). The strong situation hypothesis. *Personality and Social*
1436 *Psychology Review*, *13*(1), 62–72. <https://doi.org/10.1177/1088868308329378>

- 1437 Costa, P. T., & McCrae, R. R. (1980). Influence of extraversion and neuroticism on subjective well-
1438 being: Happy and unhappy people. *Journal of Personality and Social Psychology*, 38(4), 668–
1439 678. <https://doi.org/10.1037/0022-3514.38.4.668>
- 1440 Costa, P. T., & McCrae, R. R. (1995). Domains and facets: Hierarchical personality assessment using
1441 the Revised NEO Personality Inventory. *Journal of Personality Assessment*, 64(1), 21–50.
1442 http://dx.doi.org/10.1207/s15327752jpa6401_2
- 1443 Denissen, J. J. A., Geenen, R., Soto, C. J., John, O. P., & van Aken, M. A. G. (2020). The Big Five
1444 Inventory-2: Replication of psychometric properties in a Dutch adaptation and first evidence for
1445 the discriminant predictive validity of the facet scales. *Journal of Personality Assessment*,
1446 102(3), 309–324. <https://doi.org/10.1080/00223891.2018.1539004>
- 1447 Depaoli, S., & van de Schoot, R. (2017). Improving transparency and replication in Bayesian statistics:
1448 The WAMBS-Checklist. *Psychological Methods*, 22(2), 240–261.
1449 <https://doi.org/10.1037/met0000065>
- 1450 Depue, R. A., & Collins, P. F. (1999). Neurobiology of the structure of personality: Dopamine,
1451 facilitation of incentive motivation, and extraversion. *Behavioral and Brain Sciences*, 22(3),
1452 491-517. <https://doi.org/10.1017/S0140525X99002046>
- 1453 DeYoung, C. G. (2013). The neuromodulator of exploration: A unifying theory of the role of dopamine
1454 in personality. *Frontiers in Human Neuroscience*, 7, Article 762.
1455 <https://doi.org/10.3389/fnhum.2013.00762>
- 1456 Diener, E. (1984). Subjective well-being. *Psychological Bulletin*, 95(3), 542–575.
1457 <https://doi.org/10.1037/0033-2909.95.3.542>
- 1458 Diener, E., Larsen, R. J., & Emmons, R. A. (1984). Person × situation interactions: Choice of situations
1459 and congruence response models. *Journal of Personality and Social Psychology*, 47(3), 580–
1460 592. <https://doi.org/10.1037/0022-3514.47.3.580>

- 1461 Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale.
1462 *Journal of Personality Assessment*, 49(1), 71-75. https://doi.org/10.1207/s15327752jpa4901_13
- 1463 Dilchert, S., & Ones, D. S. (2009). Assessment center dimensions: Individual differences correlates and
1464 meta-analytic incremental validity. *International Journal of Selection and Assessment*, 17(3),
1465 254–270. <https://doi.org/10.1111/j.1468-2389.2009.00468.x>
- 1466 Entringer, T. M., & Gosling, S. D. (2022). Loneliness during a nationwide lockdown and the
1467 moderating effect of extroversion. *Social Psychological and Personality Science*, 13(3), 769–
1468 780. <https://doi.org/10.1177/19485506211037871>
- 1469 Feddersen, J., Metcalfe, R., & Wooden, M. (2016). Subjective wellbeing: Why weather matters.
1470 *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 179(1), 203-228.
1471 <https://doi.org/10.1111/rssa.12118>
- 1472 Folk, D., Okabe-Miyamoto, K., Dunn, E., & Lyubomirsky, S. (2020). Did social connection decline
1473 during the first wave of COVID-19? The role of extraversion. *Collabra: Psychology*, 6(1),
1474 Article 37. <https://doi.org/10.1525/collabra.365>
- 1475 Geukes, K., Breil, S. M., Hutteman, R., Nestler, S., Küfner, A. C. P., & Back, M. D. (2019). Explaining
1476 the longitudinal interplay of personality and social relationships in the laboratory and in the
1477 field: The PILS and the CONNECT study. *PloS One*, 14(1), Article e0210424.
1478 <https://doi.org/10.1371/journal.pone.0210424>
- 1479 Gray, J. A. (1987). *The psychology of fear and stress*. Cambridge University Press.
- 1480 Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., Webster, S., Cameron-Blake,
1481 E., Hallas, L., Majumdar, S., & Tatlow, H. (2021). A global panel database of pandemic
1482 policies (Oxford COVID-19 Government Response Tracker). *Nature Human Behaviour*, 5(4),
1483 529-538. <https://doi.org/10.1038/s41562-021-01079-8>

- 1484 Harari, G. M., Müller, S. R., Stachl, C., Wang, R., Wang, W., Bühner, M., Rentfrow, P. J., Campbell,
1485 A. T., & Gosling, S. D. (2020). Sensing sociability: Individual differences in young adults'
1486 conversation, calling, texting, and app use behaviors in daily life. *Journal of Personality and*
1487 *Social Psychology, 119*(1), 204–228. <https://doi.org/10.1037/pspp0000245>
- 1488 Harris, K., English, T., Harms, P. D., Gross, J. J., & Jackson, J. J. (2017). Why are extraverts more
1489 satisfied? Personality, social experiences, and subjective well-being in college. *European*
1490 *Journal of Personality, 31*(2), 170–186. <https://doi.org/10.1002/per.2101>
- 1491 Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate Behavioral*
1492 *Research, 50*(1), 1-22. <https://doi.org/10.1080/00273171.2014.962683>
- 1493 Hudson, N. W., Lucas, R. E., & Donnellan, M. B. (2020). Are we happier with others? An
1494 investigation of the links between spending time with others and subjective well-being. *Journal*
1495 *of Personality and Social Psychology, 119*(3), 672–694. <https://doi.org/10.1037/pspp0000290>
- 1496 Jacobs, I., & Scholl, W. (2005). Interpersonale Adjektivliste (IAL). Die empirische Umsetzung
1497 theoretischer Circumplex-Eigenschaften für die Messung interpersonaler Stile. *Diagnostica,*
1498 *51*(3), 145-155. <https://doi.org/10.1026/0012-1924.51.3.145>
- 1499 Kahneman, D., Krueger, A. B., Schkade, D. A., Schwarz, N., & Stone, A. A. (2004). A survey method
1500 for characterizing daily life experience: The day reconstruction method. *Science, 306*(5702),
1501 1776–1780. <https://doi.org/10.1126/science.1103572>
- 1502 Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking "big" personality traits to anxiety,
1503 depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin, 136*(5), 768–
1504 821. <https://doi.org/10.1037/a0020327>
- 1505 Krämer, M. D., Roos, Y., Richter, D., & Wrzus, C. (2022). Resuming social contact after months of
1506 contact restrictions: Social traits moderate associations between changes in social contact and

- 1507 well-being. *Journal of Research in Personality*, 98, Article 104223.
1508 <https://doi.org/10.1016/j.jrp.2022.104223>
- 1509 Kritzler, S., Krasko, J., & Luhmann, M. (2020). Inside the happy personality: Personality states,
1510 situation experience, and state affect mediate the relation between personality and affect.
1511 *Journal of Research in Personality*, 85, Article 103929.
1512 <https://doi.org/10.1016/j.jrp.2020.103929>
- 1513 Kroencke, L., Harari, G. M., Back, M. D., & Wagner, J. (2023). Well-being in social interactions:
1514 Examining personality-situation dynamics in face-to-face and computer-mediated
1515 communication. *Journal of Personality and Social Psychology*, 124(2), 437–460.
1516 <https://doi.org/10.1037/pspp0000422>
- 1517 Kroencke, L., Harari, G. M., Katana, M., & Gosling, S. D. (2019). Personality trait predictors and
1518 mental well-being correlates of exercise frequency across the academic semester. *Social Science
1519 & Medicine*, 236, Article 112400. <https://doi.org/10.1016/j.socscimed.2019.112400>
- 1520 Kuper, N., Kroencke, L., Harari, G. M., & Denissen, J. J. A. (2022). Who benefits from which activity?
1521 On the relations between personality traits, leisure activities, and well-being. *Journal of
1522 Personality and Social Psychology*.
- 1523 Kuppens, P., Dejonckheere, E., Kalokerinos, E. K., & Koval, P. (2022). Some recommendations on the
1524 use of daily life methods in affective science. *Affective Science*, 3(2), 505-515.
1525 <https://doi.org/10.1007/s42761-022-00101-0>
- 1526 Kushlev, K., Heintzelman, S. J., Oishi, S., & Diener, E. (2018). The declining marginal utility of social
1527 time for subjective well-being. *Journal of Research in Personality*, 74, 124–140.
1528 <https://doi.org/10.1016/j.jrp.2018.04.004>
- 1529 Liu, H., Xie, Q. W., & Lou, V. W. Q. (2019). Everyday social interactions and intra-individual
1530 variability in affect: A systematic review and meta-analysis of ecological momentary

- 1531 assessment studies. *Motivation and Emotion*, 43(2), 339–353. <https://doi.org/10.1007/s11031->
- 1532 018-9735-x
- 1533 Lucas, R. E., & Baird, B. M. (2004). Extraversion and Emotional Reactivity. *Journal of Personality*
- 1534 *and Social Psychology*, 86(3), 473–485. <https://doi.org/10.1037/0022-3514.86.3.473>
- 1535 Lucas, R. E., & Diener, E. (2009). Personality and subjective well-being. In E. Diener (Ed.), *The*
- 1536 *science of well-being: The collected works of Ed Diener* (pp. 75–102). Springer Science +
- 1537 Business Media.
- 1538 Lucas, R. E., & Donnellan, M. B. (2012). Estimating the reliability of single-item life satisfaction
- 1539 measures: Results from four national panel studies. *Social Indicators Research*, 105, 323–331.
- 1540 <https://doi.org/10.1007/s11205-011-9783-z>
- 1541 Lucas, R. E., & Fujita, F. (2000). Factors influencing the relation between extraversion and pleasant
- 1542 affect. *Journal of Personality and Social Psychology*, 79(6), 1039–1056.
- 1543 <https://doi.org/10.1037/0022-3514.79.6.1039>
- 1544 Lucas, R. E., Le, K., & Dyrenforth, P. S. (2008). Explaining the extraversion/positive affect relation:
- 1545 Sociability cannot account for extraverts' greater happiness. *Journal of Personality*, 76(3), 385–
- 1546 414. <https://doi.org/10.1111/j.1467-6494.2008.00490.x>
- 1547 Lüdtke, O., Marsh, H. W., Robitzsch, A., Trautwein, U., Asparouhov, T., & Muthén, B. (2008). The
- 1548 multilevel latent covariate model: A new, more reliable approach to group-level effects in
- 1549 contextual studies. *Psychological Methods*, 13(3), 203–229. <https://doi.org/10.1037/a0012869>
- 1550 Malouff, J. M., Thorsteinsson, E. B., Schutte, N. S., Bhullar, N., & Rooke, S. E. (2010). The Five-
- 1551 Factor Model of personality and relationship satisfaction of intimate partners: A meta-analysis.
- 1552 *Journal of Research in Personality*, 44(1), 124–127. <https://doi.org/10.1016/j.jrp.2009.09.004>

- 1553 Margolis, S., Stapley, A. L., & Lyubomirsky, S. (2020). The association between Extraversion and
1554 well-being is limited to one facet. *Journal of Personality*, *88*(3), 478–484.
1555 <https://doi.org/10.1111/jopy.12504>
- 1556 McCrae, R. R., & Costa, P. T. (1991). Adding Liebe und Arbeit: The full five-factor model and well-
1557 being. *Personality and Social Psychology Bulletin*, *17*(2), 227–232.
1558 <https://doi.org/10.1177/014616729101700217>
- 1559 Meijerink-Bosman, M., Back, M., Geukes, K., Leenders, R., & Mulder, J. (2022). Discovering trends
1560 of social interaction behavior over time: An introduction to relational event modeling. *Behavior*
1561 *Research Methods*. Advance online publication. <https://doi.org/10.3758/s13428-022-01821-8>
- 1562 Mischel, W. (1977). The interaction of person and situation. In D. Magnusson & N. S. Endler (Eds.),
1563 *Personality at the cross-roads: Current issues in interactional psychology* (pp. 333-352).
1564 Lawrence Erlbaum.
- 1565 Modersitzki, N., Le Phan, V., Kuper, N., & Rauthmann, J. F. (2021). Who is impacted? Personality
1566 predicts individual differences in psychological consequences of the COVID-19 pandemic in
1567 Germany. *Social Psychological and Personality Science*, *12*(6), 1110–1130.
1568 <https://doi.org/10.1177/1948550620952576>
- 1569 Möttus, R. (2016). Towards more rigorous personality trait–outcome research. *European Journal of*
1570 *Personality*, *30*(4), 292-303. <https://doi.org/10.1002/per.2041>
- 1571 Mueller, S., Ram, N., Conroy, D. E., Pincus, A. L., Gerstorf, D., & Wagner, J. (2019). Happy like a
1572 fish in water? The role of personality–situation fit for momentary happiness in social
1573 interactions across the adult lifespan. *European Journal of Personality*, *33*(3), 298–316.
1574 <https://doi.org/10.1002/per.2198>
- 1575 Muthén, B. O., Muthén, L. K., & Asparouhov, T. (2017). *Regression and mediation analysis using*
1576 *Mplus*. Los Angeles, CA: Muthén & Muthén.

- 1577 Muthén, L. K., & Muthén, B. O. (1998–2017). *Mplus user's guide* (8th ed.). Los Angeles, CA: Muthén
1578 & Muthén.
- 1579 Nestler, S., Geukes, K., Hutteman, R., & Back, M. D. (2017). Tackling longitudinal round-robin data:
1580 A social relations growth model. *Psychometrika*, *82*(4), 1162–1181.
1581 <https://doi.org/10.1007/s11336-016-9546-5>
- 1582 Neubauer, A. B., Voelkle, M. C., Voss, A., & Mertens, U. K. (2020). Estimating reliability of within-
1583 person couplings in a multilevel framework. *Journal of Personality Assessment*, *102*(1), 10-21.
1584 <https://doi.org/10.1080/00223891.2018.1521418>
- 1585 Oerlemans, W. G., & Bakker, A. B. (2014). Why extraverts are happier: A day reconstruction study.
1586 *Journal of Research in Personality*, *50*, 11–22. <https://doi.org/10.1016/j.jrp.2014.02.001>
- 1587 Pavot, W., Diener, E., & Fujita, F. (1990). Extraversion and happiness. *Personality and Individual
1588 Differences*, *11*(12), 1299–1306. [https://doi.org/10.1016/0191-8869\(90\)90157-M](https://doi.org/10.1016/0191-8869(90)90157-M)
- 1589 Petrova, K., & Schulz, M. S. (2022). Emotional experiences in technology-mediated and in-person
1590 interactions: An experience-sampling study. *Cognition & Emotion*, *36*(4), 750-757.
1591 <https://doi.org/10.1080/02699931.2022.2043244>
- 1592 Prati, G., & Mancini, A. D. (2021). The psychological impact of COVID-19 pandemic lockdowns: A
1593 review and meta-analysis of longitudinal studies and natural experiments. *Psychological
1594 Medicine*, *51*(2), 201–211. <https://doi.org/10.1017/S0033291721000015>
- 1595 Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses:
1596 Theory, methods, and prescriptions. *Multivariate Behavioral Research*, *42*(1), 185-227.
1597 <https://doi.org/10.1080/00273170701341316>
- 1598 Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2011). Alternative methods for assessing mediation in
1599 multilevel data: The advantages of multilevel SEM. *Structural Equation Modeling*, *18*(2), 161-
1600 182. <https://doi.org/10.1080/10705511.2011.557329>

- 1601 Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2016). Multilevel structural equation models for assessing
1602 moderation within and across levels of analysis. *Psychological Methods, 21*(2), 189–205.
1603 <https://doi.org/10.1037/met0000052>
- 1604 Rammstedt, B., Danner, D., Soto, C. J., & John, O. P. (2020). Validation of the short and extra-short
1605 forms of the Big Five Inventory-2 (BFI-2) and their German adaptations. *European Journal of*
1606 *Psychological Assessment, 36*(1), 149–161. <https://doi.org/10.1027/1015-5759/a000481>
- 1607 R Core Team (2021). *R: A language and environment for statistical computing*. R Foundation for
1608 Statistical Computing, Vienna, Austria. <https://www.R-project.org/>
- 1609 Ren, D., Stavrova, O., & Loh, W. W. (2022). Nonlinear effect of social interaction quantity on
1610 psychological well-being: Diminishing returns or inverted U? *Journal of Personality and Social*
1611 *Psychology, 122*(6), 1056–1074. <https://doi.org/10.1037/pspi0000373>
- 1612 Rhodes, R. E., & Smith, N. E. I. (2006). Personality correlates of physical activity: A review and meta-
1613 analysis. *British Journal of Sports Medicine, 40*(12), 958–965.
1614 <https://doi.org/10.1136/bjism.2006.028860>
- 1615 Schmiedeberg, C., & Thönnissen, C. (2021). Positive and negative perceptions of the COVID-19
1616 pandemic: Does personality play a role? *Social Science & Medicine, 276*, Article 113859.
1617 <https://doi.org/10.1016/j.socscimed.2021.113859>
- 1618 Schönbrodt, F. D., Maier, M., Heene, M., & Zehetleitner, M. (2015). *Voluntary commitment to*
1619 *research transparency*. Retrieved from <http://www.researchtransparency.org>
- 1620 Sharpe, J. P., Martin, N. R., & Roth, K. A. (2011). Optimism and the Big Five factors of personality:
1621 Beyond neuroticism and extraversion. *Personality and Individual Differences, 51*(8), 946-951.
1622 <https://doi.org/10.1016/j.paid.2011.07.033>
- 1623 Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2012). *A 21 word solution*. Retrieved from
1624 <http://dx.doi.org/10.2139/ssrn.2160588>

- 1625 Smillie, L. D., Cooper, A. J., Wilt, J., & Revelle, W. (2012). Do extraverts get more bang for the buck?
1626 Refining the affective-reactivity hypothesis of extraversion. *Journal of Personality and Social*
1627 *Psychology, 103*(2), 306–326. <https://doi.org/10.1037/a0028372>
- 1628 Smillie, L. D., DeYoung, C. G., & Hall, P. J. (2015). Clarifying the relation between extraversion and
1629 positive affect. *Journal of Personality, 83*(5), 564–574. <https://doi.org/10.1111/jopy.12138>
- 1630 Smillie, L. D., Wilt, J., Kabbani, R., Garratt, C., & Revelle, W. (2015). Quality of social experience
1631 explains the relation between extraversion and positive affect. *Emotion, 15*(3), 339–349.
1632 <https://doi.org/10.1037/emo0000047>
- 1633 Snijders, T. A., van de Bunt, G. G., & Steglich, C. E. (2010). Introduction to stochastic actor-based
1634 models for network dynamics. *Social Networks, 32*(1), 44–60.
1635 <https://doi.org/10.1016/j.socnet.2009.02.004>
- 1636 Soto, C. J. (2019). How replicable are links between personality traits and consequential life outcomes?
1637 The life outcomes of personality replication project. *Psychological Science, 30*(5), 711–727.
1638 <https://doi.org/10.1177/0956797619831612>
- 1639 Soto, C. J., & John, O. P. (2017). Short and extra-short forms of the Big Five Inventory–2: The BFI-2-
1640 S and BFI-2-XS. *Journal of Research in Personality, 68*, 69–81.
1641 <https://doi.org/10.1016/j.jrp.2017.02.004>
- 1642 Srivastava, S., Angelo, K. M., & Vallereux, S. R. (2008). Extraversion and positive affect: A day
1643 reconstruction study of person–environment transactions. *Journal of Research in Personality,*
1644 *42*(6), 1613–1618. <https://doi.org/10.1016/j.jrp.2008.05.002>
- 1645 Stadtfeld, C., & Block, P. (2017). Interactions, actors, and time: Dynamic network actor models for
1646 relational events. *Sociological Science, 4*, 318–352. <https://doi.org/10.15195/v4.a14>

- 1647 Steel, P., Schmidt, J., & Shultz, J. (2008). Refining the relationship between personality and subjective
1648 well-being. *Psychological Bulletin*, *134*(1), 138–161. [https://doi.org/10.1037/0033-](https://doi.org/10.1037/0033-2909.134.1.138)
1649 [2909.134.1.138](https://doi.org/10.1037/0033-2909.134.1.138)
- 1650 Sun, J., Harris, K., & Vazire, S. (2020). Is well-being associated with the quantity and quality of social
1651 interactions? *Journal of Personality and Social Psychology*, *119*(6), 1478–1496.
1652 <https://doi.org/10.1037/pspp0000272>
- 1653 Sun, J., Stevenson, K., Kabbani, R., Richardson, B., & Smillie, L. D. (2017). The pleasure of making a
1654 difference: Perceived social contribution explains the relation between extraverted behavior and
1655 positive affect. *Emotion*, *17*(5), 794–810. <https://doi.org/10.1037/emo0000273>
- 1656 Tett, R. P., Toich, M. J., & Ozkum, S. B. (2021). Trait activation theory: A review of the literature and
1657 applications to five lines of personality dynamics research. *Annual Review of Organizational*
1658 *Psychology and Organizational Behavior*, *8*(1), 199–233. [https://doi.org/10.1146/annurev-](https://doi.org/10.1146/annurev-orgpsych-012420-062228)
1659 [orgpsych-012420-062228](https://doi.org/10.1146/annurev-orgpsych-012420-062228)
- 1660 Tomori, D. V., RübSamen, N., Berger, T., Scholz, S., Walde, J., Wittenberg, I., Lange, B., Kuhlmann,
1661 A., Horn, J., Mikolajczyk, R., Jaeger, V. K., & Karch, A. (2021). Individual social contact data
1662 and population mobility data as early markers of SARS-CoV-2 transmission dynamics during
1663 the first wave in Germany—an analysis based on the COVIMOD study. *BMC Medicine*, *19*,
1664 271. <https://doi.org/10.1186/s12916-021-02139-6>
- 1665 van Zalk, M. H. W., Nestler, S., Geukes, K., Hutteman, R., & Back, M. D. (2020). The codevelopment
1666 of extraversion and friendships: Bonding and behavioral interaction mechanisms in friendship
1667 networks. *Journal of Personality and Social Psychology*, *118*(6), 1269–1290.
1668 <https://doi.org/10.1037/pspp0000253>

- 1669 Venaglia, R. B., & Lemay, E. P. (2017). Hedonic benefits of close and distant interaction partners: The
1670 mediating roles of social approval and authenticity. *Personality and Social Psychology Bulletin*,
1671 43(9), 1255–1267. <https://doi.org/10.1177/0146167217711917>
- 1672 Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of*
1673 *Statistical Software*, 36(3), 1–48. <https://doi.org/10.18637/jss.v036.i03>
- 1674 Wacker, J., & Smillie, L. D. (2015). Trait extraversion and dopamine function. *Social and Personality*
1675 *Psychology Compass*, 9(6), 225–238. <https://doi.org/10.1111/spc3.12175>
- 1676 Wagner, J., Lüdtke, O., Roberts, B. W., & Trautwein, U. (2014). Who belongs to me? Social
1677 relationship and personality characteristics in the transition to young adulthood. *European*
1678 *Journal of Personality*, 28(6), 586–603. <https://doi.org/10.1002/per.1974>
- 1679 Watson, D., & Clark, L. A. (1994). *The PANAS-X: Manual for the Positive and Negative Affect*
1680 *Schedule-Expanded Form*. Ames: The University of Iowa.
- 1681 Wijngaards, I., Sisouw de Zilwa, S. C. M., & Burger, M. J. (2020). Extraversion moderates the
1682 relationship between the stringency of COVID-19 protective measures and depressive
1683 symptoms. *Frontiers in Psychology*, 11, Article 568907.
1684 <https://doi.org/10.3389/fpsyg.2020.568907>
- 1685 Wilson, K. E., & Dishman, R. K. (2015). Personality and physical activity: A systematic review and
1686 meta-analysis. *Personality and Individual Differences*, 72, 230–242.
1687 <https://doi.org/10.1016/j.paid.2014.08.023>
- 1688 Wilson, R. E., Harris, K., & Vazire, S. (2015). Personality and friendship satisfaction in daily life: Do
1689 everyday social interactions account for individual differences in friendship satisfaction?
1690 *European Journal of Personality*, 29(2), 173–186. <https://doi.org/10.1002/per.1996>

- 1691 Wrzus, C., & Neubauer, A. B. (2022). Ecological momentary assessment: A meta-analysis on designs,
1692 samples, and compliance across research fields. *Assessment*. Advance online publication.
1693 <https://doi.org/10.1177/10731911211067538>
- 1694 Zacher, H., & Rudolph, C. W. (2021). Individual differences and changes in subjective wellbeing
1695 during the early stages of the COVID-19 pandemic. *The American Psychologist*, 76(1), 50–62.
1696 <https://doi.org/10.1037/amp0000702>
- 1697 Zettler, I., Schild, C., Lilleholt, L., Kroencke, L., Utesch, T., Moshagen, M., Böhm, R., Back, M. D., &
1698 Geukes, K. (2022). The role of personality in COVID-19-related perceptions, evaluations, and
1699 behaviors: Findings across five samples, nine traits, and 17 criteria. *Social Psychological and*
1700 *Personality Science*, 13(1), 299–310. <https://doi.org/10.1177/19485506211001680>
- 1701 Zitzmann, S., & Hecht, M. (2019). Going beyond convergence in Bayesian estimation: Why precision
1702 matters too and how to assess it. *Structural Equation Modeling: A Multidisciplinary Journal*,
1703 26(4), 646-661. <https://doi.org/10.1080/10705511.2018.1545232>

1704

Appendix

1705 **Table A1**1706 *Overview of Research Models and Equations*

	Study 1	Studies 2 and 3
	<u>Latent decomposition</u>	<u>Latent decomposition</u>
	$S_{ti} = S_{w,ti} + S_{b,i}$	$S_{ti} = S_{w,ti} + S_{b,i}$
	$M_{ti} = M_{w,ti} + M_{b,i}$	$M_{ti}^* = M_{w,ti}^* + M_{b,i}^*$
		$M_{ti} = 0, \quad M_{ti}^* < \tau$ $M_{ti} = 1, \quad M_{ti}^* \geq \tau$
	$Y_{ti} = Y_{w,ti} + Y_{b,i}$	$Y_{ti} = Y_{w,ti} + Y_{b,i}$
Model 1	<u>Path c</u> Within-person level: $Y_{ti} = \beta_{y0i} + e_{yti}$ (1a) Between-person level: $\beta_{y0i} = \gamma_{y00} + \gamma_{cb}E_i + u_{y0i}$ (1b)	<u>Path c</u> Within-person level: $Y_{ti} = \beta_{y0i} + e_{yti}$ (13a) Between-person level: $\beta_{y0i} = \gamma_{y00} + \gamma_{cb}E_i + u_{y0i}$ (13b)
	<u>Main effect</u> Between-person level: γ_{cb}	<u>Main effect</u> Between-person level: γ_{cb}
Model 2	<u>Path a</u> Within-person level: $M_{ti} = \beta_{m0i} + e_{mti}$ (2a) Between-person level: $\beta_{m0i} = \gamma_{m00} + \gamma_{ab}E_i + u_{m0i}$ (2b)	<u>Path a</u> Within-person level: $P(M_{ti} = 1) = \Phi(\beta_{m0i})$ (14a) Between-person level: $\beta_{m0i} = \gamma_{m00} + \gamma_{ab}E_i + u_{m0i}$ (14b)

Paths b and c'

Within-person level:

$$Y_{ti} = \beta_{y0i} + e_{yti} \quad (3a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{bb}M_{b,i} + \gamma_{c'b}E_i + u_{y0i} \quad (3b)$$

Indirect effect

Between-person level:

$$\gamma_{ab} * \gamma_{bb} \quad (4)$$

Model 3

Paths b1, b2, and b3

Within-person level:

$$Y_{ti} = \beta_{y0i} + e_{yti} \quad (5a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{bb1}M_{b,i} + \gamma_{bb2}E_i + \gamma_{bb3}E_iM_{b,i} + u_{y0i} \quad (5b)$$

Moderation effect

Between-person interaction:

$$\gamma_{bb3}$$

Model 4

Paths c1, c2, and c3

Within-person level:

$$Y_{ti} = \beta_{y0i} + e_{yti} \quad (6a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{cb1}S_{b,i} + \gamma_{cb2}E_i + \gamma_{cb3}E_iS_{b,i} + u_{y0i} \quad (6b)$$

Moderation effectPaths b and c'

Within-person level:

$$Y_{ti} = \beta_{y0i} + e_{yti} \quad (15a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{bb}M_{b,i}^* + \gamma_{c'b}E_i + u_{y0i} \quad (15b)$$

Indirect effect

Between-person level:

$$\gamma_{ab} * \gamma_{bb} \quad (16)$$

Paths b1, b2, and b3

Within-person level:

$$Y_{ti} = \beta_{y0i} + \beta_{bw1i}M_{w,ti}^* + e_{yti} \quad (17a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{bb1}M_{b,i}^* + \gamma_{bb2}E_i + \gamma_{bb3}E_iM_{b,i}^* + u_{y0i} \quad (17b)$$

$$\beta_{bw1i} = \gamma_{bw1} + \gamma_{bw3}E_i + u_{y1i} \quad (17c)$$

Moderation effect

Cross-level interaction:

$$\gamma_{bw3}$$

Between-person interaction:

$$\gamma_{bb3}$$

Paths c1, c2, and c3

Within-person level:

$$Y_{ti} = \beta_{y0i} + \beta_{cw1i}S_{w,ti} + e_{yti} \quad (18a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{cb1}S_{b,i} + \gamma_{cb2}E_i + \gamma_{cb3}E_iS_{b,i} + u_{y0i} \quad (18b)$$

$$\beta_{cw1i} = \gamma_{cw1} + \gamma_{cw3}E_i + u_{y1i} \quad (18c)$$

Moderation effect

Between-person interaction:

$$\gamma_{cb3}$$

Model 5

Path a

Within-person level:

$$M_{ti} = \beta_{m0i} + e_{mti} \quad (7a)$$

Between-person level:

$$\beta_{m0i} = \gamma_{m00} + \gamma_{ab1}S_{b,i} + \gamma_{ab2}E_i + \gamma_{ab3}E_iS_{b,i} + u_{m0i} \quad (7b)$$

Paths b and c'

Within-person level:

$$Y_{ti} = \beta_{y0i} + e_{yti} \quad (8a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{bb}M_{b,i} + \gamma_{c' b1}S_{b,i} + \gamma_{c' b2}E_i + \gamma_{c' b3}E_iS_{b,i} + u_{y0i} \quad (8b)$$

Moderated mediation effect

Between-person level:

$$\gamma_{ab3} * \gamma_{bb} \quad (9)$$

Model 6

Path a

Within-person level:

$$M_{ti} = \beta_{m0i} + e_{mti} \quad (10a)$$

Between-person level:

Cross-level interaction:

$$\gamma_{cw3}$$

Between-person interaction:

$$\gamma_{cb3}$$

Path a

Within-person level:

$$P(M_{ti} = 1) = \Phi(\beta_{m0i} + \beta_{aw1i}S_{w,ti}) \quad (19a)$$

Between-person level:

$$\beta_{m0i} = \gamma_{m00} + \gamma_{ab1}S_{b,i} + \gamma_{ab2}E_i + \gamma_{ab3}E_iS_{b,i} + u_{m0i} \quad (19b)$$

$$\beta_{aw1i} = \gamma_{aw1} + \gamma_{aw3}E_i + u_{m1i} \quad (19c)$$

Paths b and c'

Within-person level:

$$Y_{ti} = \beta_{y0i} + \beta_{bwi}M_{w,ti}^* + \beta_{c'w1i}S_{w,ti} + e_{yti} \quad (20a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{bb}M_{b,i}^* + \gamma_{c' b1}S_{b,i} + \gamma_{c' b2}E_i + \gamma_{c' b3}E_iS_{b,i} + u_{y0i} \quad (20b)$$

$$\beta_{bwi} = \gamma_{bw} + u_{y1i} \quad (20c)$$

$$\beta_{c'w1i} = \gamma_{c'w1} + \gamma_{c'w3}E_i + u_{y2i} \quad (20d)$$

Moderated mediation effect

Within-person level:

$$\gamma_{aw3} * \gamma_{bw} \quad (21a)$$

Between-person level:

$$\gamma_{ab3} * \gamma_{bb} \quad (21b)$$

Path a

Within-person level:

$$P(M_{ti} = 1) = \Phi(\beta_{m0i} + \beta_{awi}S_{w,ti}) \quad (22a)$$

Between-person level:

$$\beta_{m0i} = \gamma_{m00} + \gamma_{ab}S_{b,i} + u_{m0i} \quad (10b)$$

Paths b and c'

Within-person level:

$$Y_{ti} = \beta_{y0i} + e_{yti} \quad (11a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{bb1}M_{b,i} + \gamma_{bb2}E_i + \gamma_{bb3}E_iM_{b,i} + \gamma_{c' b}S_{b,i} + u_{y0i} \quad (11b)$$

Moderated mediation effect

Between-person level:

$$\gamma_{ab} * \gamma_{bb3} \quad (12)$$

$$\beta_{m0i} = \gamma_{m00} + \gamma_{ab}S_{b,i} + u_{m0i} \quad (22b)$$

$$\beta_{awi} = \gamma_{aw} + u_{m1i} \quad (22c)$$

Paths b and c'

Within-person level:

$$Y_{ti} = \beta_{y0i} + \beta_{bw1i}M_{w,ti}^* + \beta_{c' wi}S_{w,ti} + e_{yti} \quad (23a)$$

Between-person level:

$$\beta_{y0i} = \gamma_{y00} + \gamma_{bb1}M_{b,i}^* + \gamma_{bb2}E_i + \gamma_{bb3}E_iM_{b,i}^* + \gamma_{c' b}S_{b,i} + u_{y0i} \quad (23b)$$

$$\beta_{bw1i} = \gamma_{bw1} + \gamma_{bw3}E_i + u_{y1i} \quad (23c)$$

$$\beta_{c' wi} = \gamma_{c' w} + u_{y2i} \quad (23d)$$

Moderated mediation effect

Within-person level:

$$\gamma_{aw} * \gamma_{bw3} \quad (24a)$$

Between-person level:

$$\gamma_{ab} * \gamma_{bb3} \quad (24b)$$

1707 *Note.* We use the following notation: Y = well-being (Study 1: happiness or life satisfaction, Studies 2 and 3: positive affect), M = social activities
 1708 (Study 1: social time, Studies 2 and 3: social interactions), S = regulation stringency, E = extraversion, e = residual variance on Level 1, u = residual
 1709 variance on Level 2. Latent between-person components carry the suffix *b*, and latent within-person components carry the suffix *w*. The suffix *t* is used
 1710 to denote time, and the suffix *i* is used to denote individuals.