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Impact of COVID-19 Restrictions on Mental Health and Physical Activity Among
LGBQAP and Heterosexual Adults

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Structured Abstract

Introduction: We compared the impact of the COVID-19 lockdown on mental health (MH) and physical activity (PA) between US adults who identify as lesbian, gay men, bisexual, queer, asexual, and pansexual (LGBQAP) and heterosexual US adults.

Method: Participants completed online questionnaires to assess PA and MH.

Results: No difference in MH was identified between LGBQAP and heterosexual participants prior to lockdown, however LGBQAP participants reported significantly worse mental health during lockdown. No group differences were found in PA, but all participants exhibited a decline in PA during lockdown.

Conclusion: This study highlights the differential impact of social restrictions on marginalized populations.

Keywords: coronavirus, LGBTQ+ communities, pandemic, wellbeing

28 **Impact of COVID-19 Restrictions on Mental Health and Physical Activity Among**
29 **LGBQAP and Heterosexual Adults**

30 On March 11, 2020, the World Health Organization declared that the spread of
31 coronavirus disease 2019 (COVID-19) had been classified as a global pandemic (World Health
32 Organization, 2020a). In the United States, like elsewhere in the world, a variety of constraints
33 were put in place to limit the spread of the disease, including shelter-in-place orders, quarantine
34 and social distancing mandates, and the closure of non-essential businesses. Such mitigation
35 efforts have no modern-day precedent and the impact on health and wellbeing is yet to be fully
36 understood, although it is likely that there will be significant public health implications as a
37 result of such measures (Faulkner et al., 2020). These include reduced opportunities for physical
38 activity (PA) as well as threats to mental health and psychosocial wellbeing (World Health
39 Organization, 2020b).

40 The COVID-19 pandemic has had a deleterious effect on mental health at a global level,
41 as evidenced through marked increases in stress, anxiety, and depression (Salari et al., 2020).
42 Likely contributing factors to the decrement in mental health include social isolation, concerns
43 about personal or familial health, financial worries, and interruptions to travel and education
44 (Faulkner et al., 2020). In the United States, 13.6% of adults surveyed in April 2020 reported
45 symptoms of serious psychological distress, compared to 3.9% in April 2018 (McGinty et al.,
46 2020). Research on past epidemics and natural disasters suggests that social inequities are
47 exacerbated during times of crisis (Gauthier et al., 2020). It is becoming increasingly clear that
48 marginalized or socially disadvantaged subgroups of the population have been disproportionately
49 affected by the pandemic (Shadmi et al., 2020). Those belonging to such groups may be more
50 susceptible than others to the attendant psychosocial consequences (Pfefferbaum & North, 2020).

51 Marginalized communities have been identified as “those excluded from mainstream
52 social, economic, educational, and/or cultural life” (Sevelius et al., 2020, p. 2009), including, but
53 not limited to groups that are excluded on the basis of race, gender identity, sexual orientation,
54 age, physical ability, language, and/or immigration status (Sevelius et al., 2020). One such
55 subgroup includes individuals who identify as lesbian, gay, bisexual, transgender, queer, and
56 other diverse sexual orientations and gender identities (LGBTQ+), who, despite well-
57 documented vulnerability to a number of social, health, and psychological risks, have received
58 minimal attention during the COVID-19 pandemic (Salerno et al., 2020).

59 Mental and physical health disparities have been documented between LGBTQ+ persons
60 and their heterosexual, cisgender counterparts (Gorczyński & Fasoli, 2020). Researchers have
61 reported increased prevalence of chronic diseases, substance abuse, anxiety, depression, and
62 suicide (Gorczyński & Fasoli, 2020). These disparities are likely a result of exposure to prejudice
63 and discrimination in the social environment, referred to as *minority stress* (Meyer, 2003), and
64 thus related to social inequalities, such as poorer access to healthcare and higher rates of poverty,
65 that disproportionately affect LGBTQ+ persons compared to heterosexual and cisgender peers
66 and may be intensified by the global pandemic (Salerno et al., 2020). For example, as a higher
67 percentage of LGBTQ+ individuals work in service industry jobs (40% compared to 20% of
68 heterosexuals), thus likely being at a higher risk of unemployment, loss of healthcare, and facing
69 greater financial distress as a result of lockdown (Salerno et al., 2020). As the pandemic
70 continues to impact societies the world over, it is important to find ways to improve or maintain
71 psychological health (Holmes et al., 2020), particularly among groups that are marginalized.

72 PA has been shown to protect both physical and mental health (Rebar et al., 2015) and
73 shows inverse associations with anxiety and depressive symptoms (McDowell et al., 2019;

74 Schuch et al., 2018). Therefore, engaging in PA might help people in coping with COVID-19-
75 related stress and mitigate its detrimental effects on mental health and wellbeing. In addition, PA
76 is strongly associated with a reduced risk for severe COVID-19 outcomes, including
77 hospitalization, intensive care unit admission, and death, even after controlling for other risk
78 factors (Sallis et al., 2021). However, the restrictions and social distancing measures adopted in
79 response to the COVID-19 pandemic left limited opportunities for planned PA, as most sports
80 facilities, gyms, and public swimming pools were closed. Likewise, opportunities for unplanned
81 PA diminished with the closure of parks and playgrounds and greater reliance on virtual
82 communication for activities such as work, education, and shopping.

83 Tison et al. (2020) examined the effect of COVID-19-related lockdown on daily step
84 counts using de-identified data collected via a smartphone app. Across 455,404 app users from
85 187 countries, there was a 27.3% decrease in mean daily step counts after 30 days of
86 confinement when compared to prepandemic data. Likewise, an analysis of Fitbit's user data
87 indicated a 5–20% reduction in total steps worldwide during the early stages of the pandemic
88 (Fitbit Inc., 2020). A number of other studies – primarily those collecting self-report data – have
89 indicated significant decreases in moderate-to-vigorous PA (Dunton et al., 2020), walking time
90 (Cheval et al., 2020; Dunton et al., 2020), and resistance-based exercise (Faulkner et al., 2020).

91 Despite overwhelming evidence of reductions in PA during the COVID-19 pandemic, it
92 is important to note that some groups have been able to sustain, or even increase, PA behavior
93 (Brand et al., 2020; Nienhuis & Lesser, 2020). Notably, it appears that individuals who have
94 been more physically active during COVID-19 restrictions have better overall mental health
95 (Jacob et al., 2020). For example, those who report a negative change (i.e., decrease) in PA and
96 exercise habits from prior to during COVID-19, also report poorer mental health (Faulkner et al.,

97 2020), increased loneliness and stress (Meyer et al., 2020), lower social, emotional and
98 psychological wellbeing, and higher generalized anxiety (Nienhuis & Lesser, 2020). Although
99 the evidence is limited by (necessarily) cross-sectional approaches to data collection, it indicates
100 that the known association between PA and superior mental health status (McDowell et al., 2019;
101 Schuch et al., 2018) can be sustained during times of stress or crisis (Cheval et al., 2020).

102 Generally, **LGBTQ+ communities** have been understudied in the realm of PA
103 (Gorczynski & Brittain, 2016), yet warrant special attention given the health disparities that
104 affect its members. Evidence from the few studies relating to PA has been equivocal. For
105 example, compared to heterosexual youth, LGB youth exhibit lower participation rates in terms
106 of 60 min of moderate-to-vigorous PA each week (lesbian/gay = 19%; bisexual = 17%
107 heterosexual = 25%; Mereish & Poteat, 2015). This discrepancy has been attributed to
108 microaggressions, discrimination, and harassment experienced in sport and PA during formative
109 years (Herrick & Duncan, 2018). **Furthermore, Herrick et al. (2021) found that proximal**
110 **minority stressors were negatively associated with the satisfaction of psychological needs in PA**
111 **settings among LGBTQ+ adults. The lack of satisfaction, in turn, undermined the motivation to**
112 **engage in PA.**

113 In contrast, other researchers have indicated that PA participation among adult lesbians,
114 gay men, and bisexual men and women is similar or greater than individuals who identify as
115 heterosexual (Boehmer et al., 2012; VanKim et al., 2017). More specifically, VanKim et al.
116 (2017) reported that lesbian and bisexual women reported higher MET-hours/week in aerobic
117 activity compared to heterosexual women. Bisexual women, as well as gay and bisexual men,
118 report higher levels of muscle strengthening activity when compared to their heterosexual
119 counterparts (Boehmer et al., 2012).

120 LGBTQ+ adults often seek safe and inclusive environments to engage in sport and PA
121 such as queer-friendly gyms (Herrick & Duncan, 2018), competitive sports teams (Willis, 2015),
122 or recreational leagues and club teams (Calwood & Smith, 2019). Lockdown restrictions and
123 social distancing measures due to COVID-19 likely impact the way in which LGBTQ+ adults
124 engage in PA. The combined impact of social restrictions and limited access to LGBTQ+
125 inclusive spaces for leisure, PA, and sport may, therefore, have a disproportionately negative
126 impact on LGBTQ+ individuals.

127 **Purpose and Hypotheses**

128 It is evident that COVID-19 has disproportionately impacted marginalized communities
129 in the United States and across the world. Nonetheless, little is known about the ramifications for
130 **LGBTQ+ communities**, bearing in mind that this subgroup of the population is already subject to
131 higher levels of disparity in mental and physical health. Accordingly, we investigated the impact
132 of the United States COVID-19 lockdown on mental health and PA among individuals who
133 identify as lesbian, bisexual, gay, queer, and other diverse sexual orientations compared to
134 heterosexual identifying participants. We tested two hypotheses: H_1 Participants representing a
135 diverse array of sexual orientations would report a larger decline in mental health from prior-to-
136 lockdown to during lockdown when compared to heterosexual participants; H_2 Participants
137 representing a diverse array of sexual orientations would report a larger decrease in planned and
138 unplanned PA from prior-to-lockdown to during lockdown when compared to heterosexual
139 participants.

140 **Method**

141 Some of the data from the present study are drawn from a larger study examining PA,
142 sedentary behavior, and mental health across four Western nations (Author citation, in press).

143 We assessed mental health and PA during the United States' initial COVID-19 lockdown.
144 Participants were also asked to answer questions about their mental health and PA prior to
145 lockdown by use of a retrospective frame.

146 **Participants**

147 Overall, 585 individuals residing in the United States participated in this study, including
148 452 (77%) women, 130 (22%) men, two (< 1%) individuals who identified as "other" and one (<
149 1%) person who "preferred not to say". Participants were all at least 18 years old and their age
150 range was 18–92 years ($M = 37.6$, $SD = 15.8$). Most participants identified their sexual
151 orientation as heterosexual ($n = 533$, 91%). Individuals also identified as lesbian ($n = 19$, 3%),
152 bisexual ($n = 21$, 4%), gay man ($n = 4$, 1%), queer ($n = 2$, < 1%), asexual ($n = 3$, < 1%), or
153 pansexual ($n = 3$, 1%). For the purposes of the current study, individuals who identified as
154 lesbian, bisexual, gay man, queer, asexual, or pansexual were collapsed into a single category (n
155 = 52, 9%). We labeled the category LGBQAP to recognize all sexual orientations indicated by
156 participants. Initial comparisons were made between LGBQAP and heterosexual participants on
157 key anthropometric indices. No significant mean differences were found in age, height, weight,
158 and BMI. Additional descriptive data pertaining to the sample can be found in Table 1.

159 **Instrumentation**

160 *Planned and Unplanned Physical Activity*

161 The Brunel Lifestyle Physical Activity Questionnaire (BLPAQ; Karageorghis et al.,
162 2005) was used to assess participants' planned and unplanned PA prior to and during the
163 COVID-19 lockdown. Planned PA was defined as, "...any activity that is scheduled into your
164 daily routine, which may enhance your health, fitness or wellbeing." Examples included brisk
165 walking, jogging, cycling, and gardening. Unplanned PA was defined as any other form of PA

166 “excluding pre-planned physical activity” and was assessed with items such as, “In general, how
167 physically demanding has your job or day-to-day activities been *during* the social distancing
168 period?” Participants were asked to respond to the nine items in this scale (six for planned PA
169 and three for unplanned PA) using a 5-point, continuous-closed numerical scale (e.g., 1 = *Not at*
170 *all*, 5 = *Highly*). Reliability and validity of the BLPAQ scores have been demonstrated in
171 previous studies (Vencato et al., 2017a; Vencato et al., 2017b). In the present sample, internal
172 consistency estimates for planned PA were .91 (prior to lockdown) and .93 during lockdown).
173 Alpha estimates were lower for the 3-item unplanned PA scale (prior to lockdown = .55, during
174 lockdown = .65). Cronbach’s alpha is often smaller among scales with fewer items (Loewenthal
175 & Lewis, 2020). The retrospective nature of measures for behaviors prior to lockdown may also
176 have served to reduce internal consistency.

177 ***Mental Health***

178 The General Health Questionnaire-12 (GHQ-12; Goldberg & Williams, 1988) was used
179 to assess participants’ mental health prior to and during the COVID-19 lockdown. This 12-item
180 scale includes items such as, “Have you recently been able to enjoy your normal day-to-day
181 activities?” to which participants respond using a 4-point scale (e.g., 0 = *More so than usual* to 3
182 = *Much less than usual*). Adequate reliability and validity evidence has been reported in previous
183 studies (see Hardy et al., 1999). In the present sample, the internal consistency estimate was .86
184 for the retrospective, prior to lockdown, administration, and .91 during lockdown.

185 **Procedures**

186 Procedures for the protection of human research participants were reviewed and accepted
187 by an institutional ethics review board. Data were collected via Qualtrics (Provo, UT) at one time
188 point using a self-report, survey-based approach. Individuals were invited to take part in the

189 study and provided with direct access to the online survey via recruitment posts on social media
190 (e.g., Facebook, Instagram, and Twitter) and direct email communication. Collection occurred in
191 the early phases of the COVID-19 pandemic in the United States (April 24–May 18, 2020). The
192 timing of the collection captured the initial, and possibly most dramatic, change to people’s daily
193 routines related to various pandemic restrictions. Participants provided informed consent and the
194 survey took ~20 min to complete.

195 **Statistical Analysis**

196 The Statistical Package for the Social Sciences (SPSS) v26.0 (Armonk, NY) was used to
197 conduct the analyses described herein. Prior to the analyses, data were screened for missing data,
198 outliers, normality within each cell of the analysis, and other assumptions that underlie analysis
199 of variance (ANOVA). Descriptive statistics were conducted to evaluate the demographic
200 variables, COVID-19 status, and PA both prior to and during COVID-19 lockdown. A 2 (Time)
201 \times 2 (Sexual Orientation) mixed-model (within–between) ANOVA was conducted to examine
202 mental health, and a 2 (Time) \times 2 (Sexual Orientation) mixed-model (within–between)
203 MANOVA was conducted to examine planned and unplanned PA. Simple effects tests and
204 Bonferroni-adjusted post hoc comparisons were used as appropriate. Additionally, Pearson
205 product-moment correlations were computed to examine the relationship between mental health
206 and PA for both LGBTQAP and heterosexual participants. Alpha was set at .05 for all analyses,
207 unless otherwise specified.

208 **Results**

209 The survey was opened 1,858 times and 1,153 participants met the initial criteria of
210 residing in the United States, being \geq 18 years old and able to complete the survey in English.
211 Participants who did not complete the survey in its entirety were removed prior to the analyses,

212 resulting in 595 usable survey responses. Ten participants were removed because they did not
213 identify their sexual orientation. Consequently, 585 surveys were deemed suitable for analysis.
214 Data were inspected for univariate outliers exhibiting z -scores $> \pm 3.29$. Outlying scores were
215 reduced to the highest or lowest value not considered an outlier (Tabachnick & Fidell, 2019).
216 The normality of dependent variables was then assessed and all were negatively skewed (planned
217 PA at both time periods) or positively skewed (unplanned PA and mental health at both time
218 periods; all $ps < .001$). Given the relative robustness of (M)ANOVA in the case of skewed
219 distributions (Tabachnick & Fidell, 2019), data transformations were not applied.

220 To address our first hypothesis, we compared the impact of lockdown on the mental
221 health of LGBQAP vs. heterosexual participants. A 2 (Time) \times 2 (Sexual Orientation) ANOVA
222 revealed a significant two-way interaction, $F(1, 583) = 6.19, p = .013, \eta_p^2 = .01$. A simple effects
223 test was conducted to analyze the interaction. No significant mean difference was found between
224 LGBQAP ($M = 11.7, SD = 4.9$) and heterosexual participants' ($M = 11.1, SD = 4.2$) retrospective
225 responses to the GHQ-12, $t(583) = -0.97, p = .331, d = .14, 95\%CI: -1.8-0.6$. However, during
226 lockdown, LGBQAP participants ($M = 19.6, SD = 6.9$) reported significantly higher GHQ-12
227 scores, indicating poorer mental health when compared to heterosexuals ($M = 16.4, SD = 7.2$),
228 $t(583) = -3.06, p = .002, d = .45, 95\%CI: -5.2-1.1$.

229 Thereafter, we considered the impact of the COVID-19 lockdown restrictions on PA.
230 Prior to lockdown, participants estimated that they completed 33.7% ($SD = 30.8$) of their
231 exercise at home, 31.1% ($SD = 31.8$) at a gym or health club, and 35.2% ($SD = 26.8$) outdoors.
232 During lockdown, home based ($M = 56.8\%, SD = 31.7$), and outdoor exercise ($M = 42.0\%, SD =$
233 31.4) significantly increased, $t(584) = -17.03, p < .001, d = 0.70, 95\%CI: -25.8-20.4$ and $t(584)$

234 = -5.58, $p < .001$, $d = 0.23$, 95%CI: -9.2--4.4, respectively. Gym or health club use significantly
235 decreased to 1.3% ($SD = 8.4\%$), $t(584) = 22.72$, $p < .001$, $d = 1.25$, 95%CI: 27.3--32.5.

236 We computed a mixed-model MANOVA to determine whether PA frequency (planned
237 and unplanned) differed between LGBQAP and heterosexual participants. No Time \times Sexual
238 Orientation interaction emerged, Wilks's $\Lambda = 1.00$, $F(2, 582) = 1.55$, $p = .212$, $\eta_p^2 = .00$.
239 Additionally, no significant mean differences were found in PA between LGBQAP and
240 heterosexual participants, Wilks's $\Lambda = 1.00$, $F(2, 582) = 0.24$, $p = .79$, $\eta_p^2 = .00$. Nonetheless, a
241 significant main effect of time emerged, Wilks's $\Lambda = .92$, $F(2, 582) = 25.50$, $p < .001$, $\eta_p^2 = .08$.
242 Participants reported higher planned PA prior to lockdown ($M = 3.8$, $SD = 1.0$) compared to
243 during ($M = 3.5$, $SD = 1.1$), $F(1, 583) = 17.13$, $p < .001$, $d = 0.28$, 95%CI: 0.16--0.46. Similarly,
244 unplanned PA was significantly higher prior to lockdown ($M = 2.4$, $SD = 0.7$) compared to
245 during ($M = 2.1$, $SD = 0.8$), $F(1, 583) = 46.91$, $p < .001$, $d = 0.38$, 95%CI: .28--.50.

246 We ran correlation analyses between mental health and PA in both groups of participants,
247 both prior to and during lockdown. For LGBQAP individuals prior to lockdown, no significant
248 linear relationship was found between mental health and planned PA ($r = .00$, $p = .984$), but a
249 marginally significant negative relationship was found between mental health and unplanned PA
250 ($r = -.28$, $p = .046$). As unplanned PA increased, GHQ-12 scores decreased (i.e., mental health
251 was improved). This pattern of relationships remained consistent during lockdown ($r = -.13$, $p =$
252 $.377$ and $r = -.36$, $p = .008$, respectively). For heterosexual participants prior to lockdown, a
253 weak but significant relationship was found between mental health and planned PA ($r = -.14$, $p =$
254 $.002$), but there was no significant relationship with unplanned PA ($r = -.08$, $p = .070$). During
255 lockdown, mental health exhibited a significant negative correlation with both planned ($r = -.22$,
256 $p < .001$) and unplanned PA ($r = -.22$, $p < .001$) in heterosexual participants.

257 Discussion

258 The sudden onset of the COVID-19 pandemic and the restrictions set in place to combat
259 the virus have disrupted daily activities, leading to changes in mental and physical wellbeing.
260 While the global pandemic has disaffected all segments of society, marginalized groups have
261 experienced a substantially greater burden. The purpose of the present study was to examine the
262 impact of the COVID-19 lockdown on mental health and PA among individuals who identify as
263 lesbian, bisexual, gay, queer, and other diverse sexual orientations compared to those who
264 identify as heterosexual.

265 To address our first hypothesis (H_1), we found that while all participants reported a
266 decrease in mental health during lockdown, this drop was significantly larger for LGBTQAP
267 participants. This finding is consistent with how other marginalized groups have been afflicted
268 by the COVID-19 pandemic. For example, researchers have reported mental health disparities as
269 a consequence of race and ethnicity (McKnight et al., 2021) as well as gender (Gausman &
270 Langer, 2020). Thus far, sexual orientation has been largely ignored. The present findings begin
271 to fill a gap in the literature that will serve as a bridge toward appropriate mental health support
272 for LGBTQAP persons (Gorczynisk & Fasoli, 2020). As PA has a potentially protective effect in
273 regard to decrements in mental health, we explored how both groups engaged in PA prior to and
274 during lockdown, as well the relationships between mental health and PA.

275 Prior to the COVID-19 lockdown, participants in the current study reported a fair level of
276 PA. More specifically, the BLPAQ scores illustrate that, relative to the normative values for
277 planned and unplanned PA reported by Karageorghis et al. (2005), both groups of present
278 participants exceeded these pre-lockdown. Moreover, PA levels on the whole were indicative of
279 a frequency, duration, and intensity of weekly activity that is a small degree below what is

280 recommended by the ACSM (2018). The during lockdown scores show a decrement in PA that is
281 of an equal measure in the planned and unplanned dimensions. The drop shifts the weekly
282 frequency, duration, and intensity of activity to a moderate degree below ACMS
283 recommendations.

284 The levels of PA engagement between LGBQAP and heterosexual participants were
285 similar, consistent with previous research that has demonstrated similar PA participation rates
286 between LGB and heterosexual individuals (Boehmer et al., 2012; VanKim et al., 2017). We
287 observed a small but significant decrease in both planned and unplanned PA across the study
288 sample during the initial COVID-19 lockdown, which is consistent with other researchers (e.g.,
289 Cheval et al., 2020; Dunton et al., 2020; Tison et al., 2020) who reported decreases in PA as a
290 result of lockdown restrictions, but did not distinguish between planned and unplanned PA. The
291 magnitude of the drop in planned and unplanned PA was broadly analogous to that reported in
292 other Western nations over the same time period (e.g., France; Guérin et al., 2021). No
293 differences in PA habits, planned or unplanned, were observed between LGBQAP and
294 heterosexual individuals during lockdown. This finding is contrary to our expectation that
295 COVID-19 restrictions would have a more negative impact on LGBQAP participants (H_2). It
296 also contrasts with initial findings pertaining to other marginalized groups; for example, racial
297 differences have been reported during but not prior to lockdown for exercise frequency (Bann et
298 al., 2020). We did find that PA positively contributed to mental health in both groups. During
299 lockdown, both planned and unplanned PA were weakly, but significantly, associated with
300 mental health in heterosexual respondents. For LGBQAP participants, a moderate association
301 was found between mental health and the frequency of unplanned PA.

302 While only minimal differences were found in frequency of PA, participant responses
303 reflected a notable shift in *where* PA took place. Certainly, access to gyms and other organized
304 PA venues was limited or entirely unavailable given the imposition of social distancing and
305 quarantine restrictions. Accordingly, it is unsurprising that the percentage of time spent
306 exercising in a gym or health club exhibited a dramatic decline (from 31.1% to 1.3%). This was
307 offset somewhat by an increase in time spent exercising at home and in outdoor spaces during
308 lockdown. This change in exercise environment would have forced many individuals into
309 modifying current exercise habits and/or adopting new PA behaviors. Albeit these changes did
310 not result in a difference in PA between groups based on sexual orientation, it is possible that the
311 changes in the social facets of PA affected these groups differentially. For example, given that
312 individuals who identify as LGBQAP would already have been more likely to avoid traditional
313 gym settings (Herrick & Duncan, 2018), unplanned PA could be more conducive to LGBQAP
314 participation, thus resulting in a stronger link with mental health than planned PA.

315 Social restrictions imposed in March 2020 across the United States to “flatten the curve”
316 such as social distancing, self-isolation, and quarantine had the likely consequence of detaching
317 many LGBQAP individuals from their PA and social networks. While Herrick and Duncan
318 (2018) noted that sport and PA are generally in the heterosexual domain, increased opportunities
319 to participate in queer-inclusive spaces exist that encourage PA participation in LGBTQ+
320 communities. Inclusive spaces for sport and PA offer a sense of community and belonging
321 (Calwood & Smith, 2019), promote collective self-efficacy, and foster a sense of self-
322 empowerment (Krane et al., 2005). Inclusive competitive recreational teams (e.g., gay male
323 soccer team; Willis, 2015) or leagues also provide a safe space for individuals to participate in
324 sport and socialize with other LGBTQ+ individuals or allies. During lockdown, as most gyms

325 closed and athletic teams were unable to compete, individuals shifted their PA primarily to the
326 home and outdoors, likely reducing more social forms of PA.

327 In addition to PA restrictions, individuals were no longer able to access some LGBTQ+-
328 inclusive spaces like gay bars or teen and community centers that can foster social bonds
329 (Anderson & Knee, 2020). Similarly, COVID-19 restrictions limited access to large community
330 events like Pride Parades, commonly held in the month of June (Haynes, 2020). Many LGBTQ+
331 adolescents may have been forced to spend more time in home environments where they are not
332 accepted or supported, or where they may have not disclosed their sexual orientation or gender
333 identity (Salerno et al., 2020). Older members of LGBTQ+ communities are twice as likely to
334 live alone when compared with their heterosexual counterparts, and 3–4 times less likely to have
335 children, making them more vulnerable to social isolation and its potentially deleterious
336 consequences (Yang et al., 2018). In the current study, a greater percentage of LGBQAP
337 participants identified as single (63.5% compared to 46.2% of heterosexual participants) and
338 fewer indicated that had children living at home with them (12% compared to 30% of
339 heterosexual participants). Thus, it is not surprising that the imposed restrictions had a marked
340 effect on the mental health of LGBQAP participants.

341 **Implications of the Present Findings**

342 Lessons learned from the present study can be applied to benefit LGBTQ+ communities
343 for future disturbances to social norms of this nature. Health, wellness, and sport professionals
344 who work with LGBQAP clients/patients/athletes should take note of the differential impact on
345 mental health and adjust their level of support as necessary during such times of social isolation.
346 Additional digital check-ins or increased scheduling of virtual or socially-distanced gatherings
347 may be warranted to maintain a sense of social connectedness (e.g., Perone et al., 2020).

348 Practitioners might also discuss how maintaining PA habits at home or outdoors can support
349 mental health. Individuals and companies that provide digital exercise instruction might consider
350 engaging the LGBQAP population, offering inclusive programming that is directly targeted at
351 them. Finally, exercise/sport professionals should be prepared to refer any individual who is
352 experiencing mental health challenges to an appropriate health professional.

353 **Suggestions for Future Research**

354 Future researchers might address the long-term effects of lockdown on **LGBTQ+**
355 **communities**. Negative impacts on mental health have likely continued past the end of the first
356 lockdown (approximately May 25 2020, varying by state), as many states continue to encourage
357 or mandate social-distancing measures that inhibit social gatherings, until COVID-19 vaccines
358 are widely administered. Surveillance and interventions aimed at maintaining and improving
359 mental health are particularly important in this subgroup of the population. Researchers should
360 also continue to examine LGBQAP persons' access to mental healthcare against a backdrop of a
361 highly increased need among the general population.

362 **Limitations of the Present Study**

363 We acknowledge that some aspects of the research design limit generalizability of our
364 findings. Retrospective assessment of mental health and PA in relation to the pre-lockdown
365 period could have introduced recall errors and biases, potentially represented by greater
366 variability in those assessments. Caution should be exercised when considering the retrospective
367 analysis. In addition, the disproportionate sample sizes of heterosexual and LGBQAP adults may
368 have influenced the analysis and outcomes of this study. **For example, while the LGBQAP**
369 **participant representation in this study is similar to national estimates and reflects other work**
370 **examining PA in this population (e.g., Boehmer et al., 2012; VanKim et al., 2012), we were**

371 unable to control for other factors associated with PA participation, such as gender and education
372 level, due to the uneven subsamples within the overall sample. We acknowledge that the
373 relationship between mental health and PA is highly complex and nuanced, but offer the present
374 findings as a point of origin in furthering understanding of the impact of the COVID-19
375 pandemic.

376 In order to allow for comparisons, we condensed individuals who identify as LGBQAP
377 into a single group. In doing so, we risk homogenizing a complex community. Further, our data
378 do not represent transgender adults or other diverse gender identities. As transgender individuals
379 tend to report lower levels of PA (Jones et al., 2017) and disproportionality greater negative
380 mental health outcomes (James et al., 2016), it is critical that gender identity also be considered
381 when considering the impact of lockdown on mental and physical health in marginalized groups.
382 Moreover, as Herrick and Duncan (2018) noted, intersectionality should be accounted for when
383 considering PA participation among the LGBTQ+ population. Our sample was primarily white
384 and of a middle-class background. The experiences of LGBTQ+ individuals who also identify as
385 Black, Indigenous, and people of color (BIPOC) are therefore underrepresented. We recognize
386 that the study findings and associated limitations are specific to the COVID-19 context.
387 However, the limitations acknowledged should be addressed in future mental and physical
388 wellbeing research involving marginalized groups as they appear to be a recurring issue within
389 the extant literature (Gorczynski & Brittain, 2016).

390 **Conclusions**

391 The present findings add to a rapidly growing literature that serves to increase
392 understanding of the wide-ranging psychological and physical impact of COVID-19. While the
393 drastic social restrictions of COVID-19 touched all parts of society, the isolating impact of such

394 measures will vary for different groups within society. Our findings indicate that the COVID-19
395 lockdown had a more negative impact on LGBTQAP individuals. This is particularly concerning
396 given that such individuals are already more likely to struggle with mental health concerns and
397 have poorer access to healthcare.

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579 Table 1
 580
 581 *Sample Demographic and Anthropometric Data*
 582

| Variable | LGBQ (<i>n</i> = 52) | | Heterosexual (<i>n</i> = 533) | | Total (<i>N</i> = 583) | |
|--------------|-----------------------|-----------|--------------------------------|-----------|-------------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Age (years) | 35.1 | 13.9 | 37.8 | 16.0 | 37.6 | 15.8 |
| Height (in.) | 65.5 | 3.2 | 66.3 | 3.9 | 66.2 | 3.9 |
| Weight (lb) | 167.3 | 42.1 | 166.9 | 38.7 | 167.0 | 39.0 |
| BMI | 27.1 | 6.0 | 26.5 | 5.6 | 26.5 | 5.6 |

| | LGBQ (<i>n</i> = 52) | | Heterosexual (<i>n</i> = 533) | | Total (<i>N</i> = 583) | |
|---|-----------------------|-----|--------------------------------|-----|-------------------------|-----|
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % |
| Sex | | | | | | |
| Male | 5 | 10 | 125 | 24 | 130 | 22 |
| Female | 45 | 87 | 407 | 76 | 452 | 77 |
| Other | 1 | 2 | 1 | < 1 | 2 | < 1 |
| Prefer not to say | 1 | 2 | 0 | 0 | 1 | < 1 |
| Race | | | | | | |
| American Indian/Alaska Native | 1 | < 1 | 0 | 0 | 1 | < 1 |
| Asian | 29 | 5 | 29 | 5 | 30 | 5 |
| Black or African American | 3 | 6 | 29 | 5 | 32 | 6 |
| White | 42 | 81 | 434 | 81 | 476 | 81 |
| Native Hawaiian or Other Pacific Islander | 0 | 0 | 2 | < 1 | 2 | < 1 |
| More than one race | 3 | 6 | 27 | 5 | 30 | 5 |
| Prefer not to say | 1 | 2 | 1 | < 1 | 2 | < 1 |
| Other | 1 | 2 | 11 | 2 | 12 | 2 |
| Ethnicity | | | | | | |
| Hispanic or Latino | 3 | 6 | 37 | 7 | 40 | 7 |
| Not Hispanic or Latino | 494 | 93 | 48 | 92 | 542 | 92 |
| Did not respond | 1 | 2 | 2 | < 1 | 3 | < 1 |

583