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7 Impact of COVID-19 Restrictions on Mental Health and Physical Activity Among

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LGBTQAP and Heterosexual Adults

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Structured Abstract

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

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

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

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

20

21 **Keywords:** coronavirus, LGBTQ+ communities, pandemic, wellbeing

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

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

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

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

77 Tison et al. (2020) examined the effect of COVID-19-related lockdown on daily step
78 counts using de-identified data collected via a smartphone app. Across 455,404 app users from
79 187 countries, there was a 27.3% decrease in mean daily step counts after 30 days of
80 confinement when compared to prepandemic data. Likewise, an analysis of Fitbit's user data
81 indicated a 5–20% reduction in total steps worldwide during the early stages of the pandemic
82 (Fitbit Inc., 2020). A number of other studies – primarily those collecting self-report data – have
83 indicated significant decreases in moderate-to-vigorous PA (Dunton et al., 2020), walking time
84 (Cheval et al., 2020; Dunton et al., 2020), and resistance-based exercise (Faulkner et al., 2020).

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

91 2020), increased loneliness and stress (Meyer et al., 2020), lower social, emotional and
92 psychological wellbeing, and higher generalized anxiety (Nienhuis & Lesser, 2020). Although
93 the evidence is limited by (necessarily) cross-sectional approaches to data collection, it indicates
94 that the known association between PA and superior mental health status (McDowell et al., 2019;
95 Schuch et al., 2018) can be sustained during times of stress or crisis (Cheval et al., 2020).

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

107 In contrast, other researchers have indicated that PA participation among adult lesbians,
108 gay men, and bisexual men and women is similar or greater than individuals who identify as
109 heterosexual (Boehmer et al., 2012; VanKim et al., 2017). More specifically, VanKim et al.
110 (2017) reported that lesbian and bisexual women reported higher MET-hours/week in aerobic
111 activity compared to heterosexual women. Bisexual women, as well as gay and bisexual men,
112 report higher levels of muscle strengthening activity when compared to their heterosexual
113 counterparts (Boehmer et al., 2012).

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

121 **Purpose and Hypotheses**

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

134 **Method**

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

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

140 **Participants**

141 Overall, 585 individuals residing in the United States participated in this study, including
142 452 (77%) women, 130 (22%) men, two (< 1%) individuals who identified as "other" and one (<
143 1%) person who "preferred not to say". Participants were all at least 18 years old and their age
144 range was 18–92 years ($M = 37.6$, $SD = 15.8$). Most participants identified their sexual
145 orientation as heterosexual ($n = 533$, 91%). Individuals also identified as lesbian ($n = 19$, 3%),
146 bisexual ($n = 21$, 4%), gay man ($n = 4$, 1%), queer ($n = 2$, < 1%), asexual ($n = 3$, < 1%), or
147 pansexual ($n = 3$, 1%). For the purposes of the current study, individuals who identified as
148 lesbian, bisexual, gay man, queer, asexual, or pansexual were collapsed into a single category (n
149 = 52, 9%). We labeled the category LGBQAP to recognize all sexual orientations indicated by
150 participants. Initial comparisons were made between LGBQAP and heterosexual participants on
151 key anthropometric indices. No significant mean differences were found in age, height, weight,
152 and BMI. Additional descriptive data pertaining to the sample can be found in Table 1.

153 **Instrumentation**

154 *Planned and Unplanned Physical Activity*

155 The Brunel Lifestyle Physical Activity Questionnaire (BLPAQ; Karageorghis et al.,
156 2005) was used to assess participants' planned and unplanned PA prior to and during the
157 COVID-19 lockdown. Planned PA was defined as, "...any activity that is scheduled into your
158 daily routine, which may enhance your health, fitness or wellbeing." Examples included brisk
159 walking, jogging, cycling, and gardening. Unplanned PA was defined as any other form of PA

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

171 ***Mental Health***

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

179 **Procedures**

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

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

189 **Statistical Analysis**

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

202 **Results**

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

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

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

223 Thereafter, we considered the impact of the COVID-19 lockdown restrictions on PA.
224 Prior to lockdown, participants estimated that they completed 33.7% ($SD = 30.8$) of their
225 exercise at home, 31.1% ($SD = 31.8$) at a gym or health club, and 35.2% ($SD = 26.8$) outdoors.
226 During lockdown, home based ($M = 56.8\%, SD = 31.7$), and outdoor exercise ($M = 42.0\%, SD =$
227 31.4) significantly increased, $t(584) = -17.03, p < .001, d = 0.70, 95\%CI: -25.8-20.4$ and $t(584)$

228 = -5.58, $p < .001$, $d = 0.23$, 95%CI: -9.2--4.4, respectively. Gym or health club use significantly
229 decreased to 1.3% ($SD = 8.4\%$), $t(584) = 22.72$, $p < .001$, $d = 1.25$, 95%CI: 27.3--32.5.

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

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

251 **Discussion**

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

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

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

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

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

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

309 Social restrictions imposed in March 2020 across the United States to “flatten the curve”
310 such as social distancing, self-isolation, and quarantine had the likely consequence of detaching
311 many LGBTQAP individuals from their PA and social networks. While Herrick and Duncan
312 (2018) noted that sport and PA are generally in the heterosexual domain, increased opportunities
313 to participate in queer-inclusive spaces exist that encourage PA participation in LGBTQ+
314 communities. Inclusive spaces for sport and PA offer a sense of community and belonging
315 (Calwood & Smith, 2019), promote collective self-efficacy, and foster a sense of self-
316 empowerment (Krane et al., 2005). Inclusive competitive recreational teams (e.g., gay male
317 soccer team; Willis, 2015) or leagues also provide a safe space for individuals to participate in
318 sport and socialize with other LGBTQ+ individuals or allies. During lockdown, as most gyms

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

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

335 **Implications of the Present Findings**

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

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

347 **Suggestions for Future Research**

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

356 **Limitations of the Present Study**

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

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

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

384 **Conclusions**

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

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

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573 Table 1
 574
 575 *Sample Demographic and Anthropometric Data*
 576

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