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Association of financial hardship with poor sleep health outcomes among men who have sex with men

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ABSTRACT

Previous studies have identified an association between socioeconomic status and sleep health. While some research has studied this association among sexual minority groups, including men who have sex with men (MSM), they exclusively focused on US-based populations. The interplay between the two in shaping sleep health has not been previously examined on populations residing outside the US. This study considers both determinants, by investigating whether financial hardship is associated with sleep health among a sample of MSM in Paris, France. Broadcast advertisements were placed on a popular geosocial-networking smartphone application for MSM to direct users in Paris to a web-based survey measuring financial hardship and five dimensions of sleep health as well as socio-demographic characteristics. Modified Poisson models with robust error variance were computed to estimate risk ratios (RRs) and 95% confidence intervals (CI) for the associations between financial hardship and the following self-reported outcomes: 1) poor sleep quality, 2) short sleep duration; and 3) sleep problems. In total, 580 respondents completed the survey. In this sample, both financial hardship and poor sleep health were common - 45.5% reported that it was extremely, very, or somewhat difficult for them to meet their monthly payments on bills (referred to as "high financial hardship") and 30.1% rated their sleep as fairly bad or very bad (referred to as "poor sleep quality"). Multivariate models revealed that, compared to participants who reported low financial hardship, those who reported high financial hardship were more likely to report poor sleep quality (aRR: 1.35, 95% CI: 1.04, 1.77), to report problems falling asleep (aRR: 1.23, 95% CI: 1.02, 1.49), and to report problems staying awake in the daytime (aRR: 3.12, 95% CI: 1.83, 5.31). Future research should investigate whether this relationship is causal and determine whether interventions to reduce financial hardships could promote sleep health among MSM.

1. Introduction

Gay, bisexual, and other men who have sex with men (MSM) often experience poor sleep health (Duncan et al., 2016a; Rahman & Silber, 2000). For example, as compared to heterosexual individuals, one study found that gay males wake up earlier and go to sleep significantly later, indicating that gay males have shorter sleep duration (Rahman & Silber, 2000). A recent study of MSM found that about one-third of the sample reported poor sleep quality and almost half reported sleeping less than 7 h every night (Duncan et al., 2016a). Poor sleep health, among the general population and among sexual minorities, has been associated with a range of adverse health outcomes, including risk of HIV, mental health, diabetes, and obesity (Buxton & Marcelli, 2010; Duncan et al., 2016a; Jean-Louis et al., 2014; Mallon, Broman, & Hetta, 2005; Xiao, Keadle, Hollenbeck, & Matthews, 2014; Zhang et al., 2015).

Emerging research has examined the role of financial hardship (when one has insufficient financial resources to adequately meet household's needs) on health outcomes (Ayala, Bingham, Kim, Wheeler, & Millett, 2012; Chi & Tucker-Seeley, 2013; Ferrie, Martikainen, Shipley, & Marmot, 2005; Lynch, Kaplan, & Shema, 1997; Tucker-Seeley, Harley, Stoddard, & Sorensen, 2013; Tucker-Seeley, Li, Subramanian, & Sorensen, 2009; Tucker-Seeley, Abel, Uno, & Prigerson,

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2015), including sleep health (Hill, Burdette, & Hale, 2009; Magee, Gordon, & Caputi, 2014; McHale, Kim, Kan, & Updegraff, 2011), among general populations. For instance, a study using data from the 2004 Survey of Texas Adults (n = 1504) found that financial hardship was associated with poor sleep quality (Hill et al., 2009). While no research has assessed the potential associations between financial hardship and various dimensions of sleep health among MSM and other sexual minority populations, there is a recent important study that investigated associations between socioeconomic status (i.e., income, employment status, education) and sleep health among gay and bisexual men living with HIV (Downing Jr et al., 2016). In particular, this US-based study found that these traditional socioeconomic status indicators were associated with sleep health, particularly poor self-reported sleep quality and the use of medication for improving sleep, among their sample of gay and bisexual men.

The minority stress model, as articulated by Meyer (Meyer, 2003), proposes that stigma, prejudice, and discrimination are chronic psychosocial stressors that can lead to negative health outcomes in marginalized populations such as MSM populations. Institutionalized forms of homophobia (e.g., a lack of employment non-discrimination protections) have significant implications for the health of sexual minorities (Hatzenbuehler, Phelan, & Link, 2013). A growing body of literature has suggested that MSM earn less than heterosexual men and that this is due to manifestations of discrimination in the workplace, including the firing of an individual or denying them employment, denying a promotion, or giving negative performance evaluations on the basis of their sexual orientation (Arabsheibani, Marin, & Wadsworth, 2006; Badgett & Frank, 2007). Wage gaps between heterosexual and sexual minority men have been reported in studies in the United States, the United Kingdom and France. For example, it is reported that MSM in France suffer from an average wage penalty equal to -6.3% when compared to heterosexual men (Laurent & Mihoubi, 2012). Socioeconomic manifestations of homophobic prejudice may lead to increased financial hardship among MSM.

It is important to note that the 2009 financial crisis brought about one of the highest unemployment rates in Western Europe (Arpaia & Curci, 2010). According to the most recent estimates, the unemployment rate in France is still above 10%, which is more than double that of the rate in the United Kingdom) (Bentolila, Cahuc, Dolado, & Le Barbanchon, 2012; Vail, 2014). The recession was also accompanied by an increase in income inequality over the past decade (Dreger, López-Bazo, Ramos, Royuela, & Suriñach, 2015), which may have exacerbated existing income differences between heterosexual and sexual minority individuals.

1.1. Study objective and Hypotheses

The objective of this study was to examine the association between financial hardship and sleep health among a sample of MSM in the Paris (France) metropolitan area, which has not been examined in any MSM sample previously. Studying this association among MSM population is significant, given the lack of existing research and the plausible relationship. Based on past empirical research (Hill et al., 2009; Magee et al., 2014; McHale et al., 2011), it is hypothesized that high levels of financial hardship will be associated with poor sleep quality, short sleep duration, and sleep problems such as problems falling and staying asleep.

2. Data and methods

In October 2016, we used broadcast advertisements on a popular geosocial-networking smartphone application for MSM to recruit our sample. We limited the advertisements to users in the Paris (France) metropolitan area. As done in previous research (Duncan et al., 2016a; Duncan et al., 2016b; Goedel & Duncan, 2015), users were shown an advertisement with text encouraging them to click through the advertisement to complete an anonymous web-based survey. The advertisement described that users who completed the survey were entered in a chance to win €65, which is approximately $US70. We provided the incentive to encourage participation. The advertisement was placed during three consecutive 24-hour weekday periods. After implementing precautions to avoid and eliminate duplicate responses (Duncan et al., 2016a), we found no apparent duplicate responses. Our survey included 52 items and was translated from English into French using an adaptation of the TRAPD (Translate, Review, Adjudicate, Pretest, Document) translation protocol, which others has been described in detail previously (Harkness, Van de Vijver, & Mohler, 2003). Five French speakers assisted with survey translation. The survey was offered in French and English. Most participants (94.3%) took the survey in French. At the end of the recruitment period, 5206 users had clicked on the advertisement and reached the landing page of the survey and 935 users provided informed consent and began the survey. In total, 580 users provided informed consent and completed the survey. This represents a completion rate of 62.0% and an overall completion rate of 11.1%. Our completion rate is comparable to other studies of MSM recruited from geosocial-networking smartphone applications (Duncan et al., 2016a; Duncan et al., 2016b; Goedel and Duncan, 2015). The New York University School of Medicine Institutional Review Board approved all protocols before any data collection.

3. Measures

3.1. Financial hardship

We evaluated financial hardship with a question on the survey reading, “How difficult is it for you to meet monthly payments on bills?” (Tucker-Seeley, Mitchell, Shires, & Modlin, 2014). Response options included: “Not at all difficult”; “Not very difficult”; “Somewhat difficult”; “Very difficult”; and “Extremely difficult”. In line with previous research, we dichotomized this variable into high financial hardship (“Somewhat difficult”; “Very difficult”; and “Extremely difficult”) and low financial hardship (“Not at all difficult” and “Not very difficult”) (Tucker-Seeley et al., 2014). In addition, we created a trichotomous financial hardship variable: high financial hardship (“Very difficult” and “Extremely difficult”), medium financial hardship (“Somewhat difficult”), and low financial hardship (“Not at all difficult” and “Not very difficult”).

3.2. Sleep health

Items were taken or adapted from The Pittsburgh Sleep Quality Index (PSQI), which is a reliable and validated scale of sleep health (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), to examine sleep quality, sleep duration, and three aspects of sleep problems.

3.2.1. Sleep quality

We examined sleep quality with the question “During the past month, how would you rate your sleep quality overall?” (Buysse et al., 1989). Response options included: “Very good”, “Fairly good”, “Fairly bad”, and “Very bad”. These four options were dichotomized into two categories as good sleep quality (responses of “Very good” and “Fairly good”) and poor sleep quality (responses of “Very bad” and “Fairly bad”) for analysis (Duncan et al., 2016a).

3.2.2. Sleep duration

Typical sleep duration was assessed with the question asking, “During the past month, how many h of actual sleep did you get each night? (This may be different from the number of hours you spent in bed.)” (Buysse et al., 1989). Responses were open-ended but limited to a single integer. Short sleep duration was defined as less than 7 h (Duncan et al., 2016a; Gallicchio & Kalesan, 2009; Hirshkowitz et al., 2015; Ruff et al., 2016; Watson et al., 2015).

3.2.3. Sleep-related problems

We assessed sleep problems with the question, "During the past month, have you experience any of the following?" We then listed three statements: 1) "I had trouble sleeping because I could not get to sleep within 30 min." (i.e., problems falling asleep) 2). "I had trouble staying awake while driving, eating meals, or engaging in social activity." (i.e., problems staying awake in the daytime also known as daytime sleepiness) 3) "I took medicine (prescribed or "over the counter") to help me sleep." (i.e., use of sleeping medication). These statements had "Yes" and "No" response options.

3.3. Covariates

A number of socio-demographic covariates were used as control variables. Participants were asked to report their age in years (categorized as 18–24, 25–29, 30–39, 40–49, 50 years and older), sexual orientation (response options: gay, bisexual, straight, other), whether or not they had been born in France (response options: yes, no), employment status (response options: employed, unemployed, student, retired), and current relationship status (response options: single, relationship with a man, relationship with a woman).

3.4. Statistical analysis

We first calculated descriptive statistics for the study variables of our MSM sample. We then calculated the correlations between measures of sleep, using the Spearman rank correlation test. After this, we compared the socio-demographic and financial hardship by levels of poor sleep health, using chi-square statistics. Modified Poisson models were computed to estimate risk ratios (RRs) and 95% confidence intervals (CI) for the associations between financial hardship and the following self-reported outcomes: 1) poor sleep quality, 2) short sleep duration; and 3) sleep-related problems – problems falling asleep and problems staying awake in the daytime. We used modified Poisson regression approach because it is an appropriate and useful model in the context of non-rare binary outcomes. We dropped the variable of use of sleeping medication from all multivariate models due to the low prevalence (6.4%) and therefore limited statistical power. Due to the low Cronbach's alpha between the three measures of sleep problems in this sample (0.21), we analyzed each sleep problem as a separate outcome. The socio-demographic variables were included in multivariate models as covariates. Additionally, the p-value for trend for trichotomous measure of financial hardship in multivariate associations was computed. Statistical analyses were conducted using Stata 14 (Stata Corp, College Station, TX).

4. Results

Table 1 shows socio-demographic characteristics of the sample according to poor sleep health. The mean age of the sample was 35.2 (SD = 9.9) years. Most participants reported their sexual orientation as gay (84%). Over three-fourths of the sample was born in France (77.6%). Approximately two-thirds were currently employed and approximately two-thirds were not in a relationship. Almost half of the sample (45.5%) reported high financial hardship, whereby 31.6% reported that it was somewhat difficult to pay monthly bills, 9.8% reported that it was very difficult to pay monthly bills, and 4.1% reported that it was extremely difficult to pay monthly bills. In our sample, 30.1% rated their sleep as fairly bad or very bad (referred to as "poor sleep quality"). No differences in poor sleep health were found based on the socio-demographic variables, except age and employment status (data not shown). Among students, for example, more than half (59.3%) reported they had problems falling asleep (Chi-square p-value < .05).

The correlation between sleep quality and sleep duration was relatively weak although significant ($r = -0.37$; $p < 0.0001$) as well as between sleep quality and problems falling asleep ($r = 0.37$; $p < 0.0001$). Significant but weak correlation between sleep quality and problems staying awake was found ($r = 0.25$; $p < 0.0001$). The

Table 1
Participants' characteristics and financial hardship by poor sleep health.

	Total, N(%)	Sleep quality, %		Sleep duration, %		Problems falling asleep, %		Problems staying awake in the daytime, %	
		Poor	Good	≤ 6 h	> 6 h	Yes	No	Yes	No
All	580 (100)	30.0	68.1	27.4	67.4	55.3	44.7	12.6	87.4
Age									
18–24	84 (14.5)	34.5	65.5	21.4	76.2	57.1	42.9	9.5	90.5
25–29	103 (17.8)	35.0	65.1	29.1	67.0	54.4	45.6	17.5	82.5
30–39	180 (31.0)	29.4	70.6	29.4	68.9	45.6	54.4	9.4	90.6
40–49	139 (24.0)	29.5	70.5	30.2	66.9	39.6	60.4	15.8	84.2
≥ 50	54 (9.3)	24.1	74.1	27.8	70.4	31.5	68.5	13.0	87.0
Sexual orientation									
Gay	487 (84.0)	30.8	68.8	26.9	69.8	46.8	53.2	13.1	86.9
Bisexual	69 (11.9)	27.5	69.6	33.3	63.8	36.2	63.8	10.1	90.0
Born in France									
Yes	450 (77.6)	29.8	70.0	28.7	68.4	46.9	53.1	11.8	88.2
No	113 (19.5)	34.5	65.5	25.7	71.7	41.6	58.4	17.7	82.3
Employment status									
Employed	388 (66.9)	29.9	70.1	29.4	68.0	43.3	56.7	12.4	87.6
Unemployed	84 (14.5)	27.4	72.6	23.8	75.0	46.4	53.6	13.1	86.9
Student	81 (14.0)	37.0	63.0	25.9	71.6	59.3	40.7	14.8	85.2
Current Relationship									
Single	378 (65.2)	30.7	69.3	27.5	69.6	46.0	54.0	12.2	87.8
In a relationship	172 (29.7)	30.8	68.6	29.1	68.6	45.9	54.1	14.0	86.1
Financial Hardship									
Not at all difficult	143 (24.7)	28.0	72.0	19.6	79.7	38.5	61.5	8.4	91.6
Not very difficult	154 (26.6)	26.0	73.4	31.1	65.6	44.2	55.8	6.5	93.5
Somewhat difficult	183 (31.6)	29.0	71.0	28.4	68.9	46.5	53.6	18.6	81.4
Very difficult	57 (9.8)	42.1	57.9	36.8	56.1	59.7	40.4	19.3	80.7
Extremely difficult	24 (4.1)	66.7	33.3	37.5	58.3	66.7	33.3	25.0	75.0

Table 2
Multivariate association (aRRs)[a] between financial hardship and poor sleep health.

	Poor sleep quality, n = 174 aRR (95% CI)	**Short sleep duration (≤ 6 h), n = 159** aRR (95% CI)	**Problems falling asleep, n = 259** aRR (95% CI)	**Problems staying awake, n = 73** aRR (95% CI)
Financial hardship				
Model 1				
Low	Referent	Referent	Referent	Referent
High	1.35 (1.04, 1.77)*	1.33 (1.00, 1.78)	1.23 (1.02, 1.49)*	3.12 (1.83, 5.31)**
Model 2				
Low	Referent	Referent	Referent	Referent
Medium	1.14 (0.84, 1.55)	1.16 (0.84, 1.60)	1.10 (0.89, 1.36)	2.86 (1.64, 4.99)**
High	2.02 (1.46, 2.79)**	1.61 (1.13, 2.32)**	1.45 (1.15, 1.84)**	3.63 (1.95, 6.77)**
p for trend	*0.002*	*0.019*	*0.007*	*< 0.0001*

aRR = adjusted risk ratio; CI = Confidence Intervals
Model 1: high financial hardship (Somewhat difficult; Very difficult; and Extremely difficult) and low financial hardship (Not at all difficult and Not very difficult).
Model 2: high financial hardship (Very difficult and Extremely difficult), medium (Somewhat difficult), and low (Not at all difficult and Not very difficult)
*p < 0.05; **p < 0.01
[a] Adjusted for age, sexual orientation, origin (born in France), employment and relationship status

correlation of sleep duration with problem falling asleep was r = -0.13 (p < 0.0027). No significant correlation between sleep duration and problem staying awake as well as problems falling asleep and problems staying awake were found (r = -0.040; p = 0.3558, r = 0.0460; p = 0.2685, respectively).

4.1. Association of financial hardship with poor sleep health outcomes

Bivariate analyses (data not shown) revealed that financial hardship differed based on poor sleep health, including poor sleep quality, short sleep duration, problems falling asleep, problems staying awake in the daytime, and use of sleep medication (all Chi-square *p*-value < .05). Table 2 presents the relationships between financial hardship and poor sleep health after adjusting for socio-demographic variables. In multivariable models, compared to people with low financial hardship, those who experienced high financial hardship were more likely to have poor sleep quality (aRR: 1.35; 95% CI: 1.04, 1.77), problems falling asleep (aRR: 1.23; 95% CI: 1.02, 1.49) and problems staying awake during the day (aRR: 3.12; 95% CI: 1.83, 5.31) (Table 2). Furthermore, in multivariable analyses with the trichotomous classification of financial hardship, we found significant associations between high financial hardship and all the sleep health outcomes with dose-response relationships. No significant associations were observed between medium financial hardship and poor sleep health, except for the problems staying awake. Those experiencing medium and high financial hardship were more likely to have problems staying awake (aRR: 2.86; 95% CI: 1.64, 4.99, aRR:3.63; 95% CI:1.95, 6.77, respectively) (p for trend < 0.0001).

5. Discussion

The objective of the present study was to examine the association between financial hardship and poor sleep health among a sample of MSM in the Paris (France) metropolitan area. This is the *first* study to examine financial hardship among a sample of MSM in the European Union, a sample that differs from general populations and MSM in the US (where most previous research on socioeconomic status and sleep has been focused). Additionally, this is the first study to examine the association among financial hardship and sleep health independently in any sample of MSM. Overall, though, there is relatively little work on socioeconomic status among sexual minority populations, including as it relates to sleep health (Downing Jr et al., 2016). While it has been suggested that same-sex couples are wealthier than their heterosexual counterparts (e.g., the “double income no children” stereotype of gay men), evidence is suggesting that gay and bisexual men individuals may be more likely to be in poverty (Albelda, Badgett, Schneebaum, & Gates, 2009; Arabsheibani et al., 2006; Badgett & Frank, 2007; Badgett, Lau, Sears, & Ho, 2007). This study therefore advances the literature on socioeconomic status and health in this population, especially regarding the dimension of financial hardship. Almost half of the sample (46%) reported high financial hardship. In addition, individuals reporting high financial hardship were more likely to report poor sleep quality, short sleep duration and sleep problems compared those individuals reporting low financial hardship, highlighting compounding effects of experiencing multiple forms of marginalization on health. There was a lack of association with sleep duration in the multivariate model with the dichotomous financial hardship variable and the results overall show that effects were primarily isolated to those where the highest levels of financial hardship (reporting that it is very difficult or extremely difficult to pay monthly bills).

Several studies have shown that there is a positive association between financial hardship and various negative health outcomes and health-damaging behaviors, including research studies showing that financial hardship is associated with poor sleep health (Hill et al., 2009; Magee et al., 2014; McHale et al., 2011). Our findings are consistent with these studies. However, our study differs from previous research conducted investigating the relationship between financial hardship and sleep health. In particular, our study examines the association exclusively on individuals who identify as MSM in France. Previous research examining the relationship between financial hardship and sleep health has predominantly focused in the U.S., paying little attention to European populations. The association found between financial hardship and poor sleep health may be due to psychological distress (which can include depression and anxiety) and/or drug use that financial hardship causes, including perhaps the stress of seeking employment. Additionally, lower socioeconomic status individuals may be unable to afford to move to a safer and quieter neighborhood, which can contribute to better sleep compared to higher socioeconomic status individuals. Both chronic and acute stress, which is directly affected by their neighborhoods, could then lead to sleep difficulties and disturbances (Cunningham, Wheaton, & Giles, 2015; Johnson, Lisabeth, Lewis, Sims, & Hickson, 2016). Financial hardship may also result in the need for individuals to increase working hours, which could reduce the actual amount of time someone can sleep. However, the pathway by which financial hardship influences different health outcomes has not yet been fully elucidated.

Future research should continue to examine financial hardship, including multiple forms of financial hardship, among sexual and gender minorities. These studies should examine various lesbian, gay, bisexual and transgender (LGBT) populations, including MSM and transgender women, as these groups are often at higher risk for negative health outcomes due to social discrimination (Arabsheibani et al., 2006;

Badgett & Frank, 2007; Badgett et al., 2007; Laurent & Mihoubi, 2012), yet are understudied in research, relative to heterosexual populations. These studies can have multiple approaches. First, qualitative methodologies can offer the advantage of grounding the exposure within a historical context, providing insights that elude statistical measurements. Second, quantitative studies that utilize longitudinal study designs would allow the establishment of causation between the exposure and the outcome. Further, these studies could benefit by incorporating more objective measures of sleep health as well as examining potential mechanisms. As discussed, one potential pathway is that financial hardship may cause psychological distress (Tucker-Seeley et al., 2013). Research to understand the pathway(s) in which financial hardship affects health outcomes, such as stress, can use self-reported methods as well as objective measures.

6. Limitations

The current study has several noteworthy limitations. Specifically, the data are self-reported and may suffer from both recall bias and social desirability bias, which may lead to inaccurate responses from the participants. Additionally, the study may suffer from same-source bias because both the exposure and the outcome in this study were measured using self-report measures (Roux, 2007). While the Pittsburgh Sleep Quality Index (PSQI) is a well-known and validated measure of sleep health, this same source bias could be avoided by using actigraphy to collect data on sleep timing, quality and duration. Notwithstanding sleep efficiency, sleep fragmentation, or wake after sleep onset derived from actigraphy are viewed as objective measures of sleep quality, but the PSQI is good and useful, as it is a measure that has been validated in many studies among different populations (Aloba, Adewuya, Ola, & Mapayi, 2007; Beaudreau et al., 2012; Buysse et al., 1989; Spira et al., 2011). Furthermore, the study is limited in that in relies upon a single item to ascertain financial hardship. Rather, multiple items should have been used to measure financial hardship to better capture a range of hardships, as done some previously in research that has examined a range of hardships (Abel et al., 2016). The range of financial hardships could be examined in a variety of ways, including by analyzing multiple specific financial hardships, such as food insecurity (Chi & Tucker-Seeley, 2013). Moreover, given the cross-sectional design utilized in this study, reverse causation and residual (unmeasured) confounding variables are a possibility. We indeed cannot provide evidence for a causal relationship between financial hardship and sleep health due to the nature of the design of our study. Reverse causation is possible: having poor sleep health may lead to poorer job performance, being fired, and in turn financial hardship. Unfortunately, the survey used did not include an item to measure night shift work, thus could not control for it. In addition, the assessment of employment status only allowed for the selection of either a student or employed, which may not ideal. Moreover, the sample was recruited from an application that has the purpose of meeting other MSM. Consequently, part of the recruited sample may be heavily involved in nightlife activities, given their willingness to meet other individuals by taking part in this application. This involvement in nightlife activities can be a confounding variable affecting their difficulties to stay awake during the day, as well as influence employment circumstances, thus influence both sleep quality and financial hardship. We acknowledge the limited generalizability of the study sample, which focused on individuals who identified as MSM in Western Europe who used a single geo-social networking application. Finally, while the survey targeted users of the popular app in the Paris metropolitan area at the time of broadcasting, we do not know if the participants were currently living in Paris,

7. Conclusions

Among a sample of MSM in the Paris (France) metropolitan area, we found that financial hardship was associated with poor sleep health. As discussed earlier, future research should investigate whether the relationship between financial hardship and sleep health is causal among MSM populations. Policies could focus on interventions to reduce financial hardships (e.g., income-based strategies for ensuring that people can secure their basic necessities) in order to promote sleep health among MSM.

Ethics approval

The New York University School of Medicine Institutional Review Board approved all protocols before any data collection.

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