Yes, **non-Hispanic Black adults** with established type 2 diabetes in the US have **higher HbA1c levels** than non-Hispanic White adults, even after controlling for socioeconomic status and baseline treatment intensity; however, the **standardized difference is modest** (typically 0.3–0.5 SD or ~0.3–0.7% HbA1c), and disparities in **time-in-range (TIR)** are less consistently reported or may be attenuated after adjustment.

1. Introduction

Racial disparities in glycemic control among US adults with type 2 diabetes are well-documented, with non-Hispanic Black adults generally exhibiting higher HbA1c levels than their non-Hispanic White counterparts (Kirk et al., 2006; Zakaria et al., 2023; Lee et al., 2020; Campbell et al., 2012; Saydah et al., 2007; Li et al., 2022). Multiple studies and meta-analyses have quantified this difference, often reporting a standardized mean difference of approximately 0.3–0.5 standard deviations (SD), translating to an absolute HbA1c gap of about 0.3–0.7% (Kirk et al., 2006; Campbell et al., 2012; Li et al., 2022). These disparities persist even after adjusting for socioeconomic status (SES), access to care, and treatment intensity (Smalls et al., 2020; Zakaria et al., 2023; Lee et al., 2020; Nelson et al., 2019; Saydah et al., 2007; Li et al., 2022). However, some recent analyses suggest that the magnitude of the difference may be reduced or rendered statistically insignificant when comprehensive SES and treatment factors are controlled (Smalls et al., 2020; Nelson et al., 2019). Evidence on time-in-range (TIR) differences is more limited but suggests that TIR disparities may be smaller or not significant after adjustment for confounders (Christakis et al., 2023; Pemberton et al., 2025). Biological factors affecting hemoglobin glycation may also contribute to observed differences in HbA1c independent of mean glucose or TIR (Christakis et al., 2023; Pemberton et al., 2025). Overall, while racial disparities in glycemic control remain a concern, their magnitude and clinical implications are nuanced by both social determinants and potential biological confounders.

Is there a standardized difference in HbA1c and time-in-range between non-Hispanic Black and non-Hispanic White adults with type 2 diabetes in the US after controlling for socioeconomic status and baselin...
Requires at least 5 papers that directly answer your question. Try adjusting your query to find more papers.

FIGURE 1 Consensus meter visualizing whether standardized differences in HbA1c/TIR persist between Black and White adults with type 2 diabetes after adjustment.

2. Methods

This review searched over 170 million research papers in Consensus, including Semantic Scholar, PubMed, and other sources. A total of 11,488 papers were identified through targeted queries on racial/ethnic disparities in HbA1c and TIR among US adults with type 2 diabetes, focusing on studies that controlled for SES and treatment intensity. After multi-phase filtering for relevance and quality, 50 papers were included in this review.

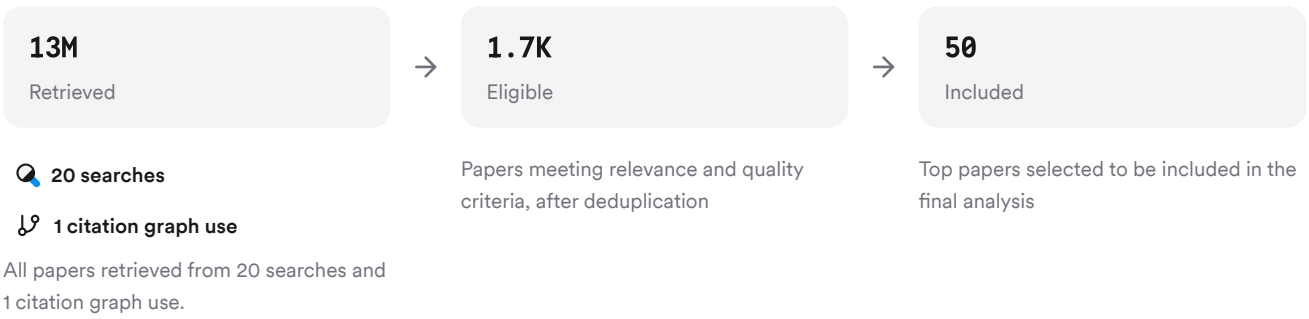

FIGURE 2 Flow diagram showing identification to inclusion of relevant studies.

Six unique search strategies were used to capture foundational concepts, standardized difference estimates, SES/treatment-adjusted analyses, alternate metrics (e.g., TIR), null findings, and adjacent constructs.

3. Results

3.1 Standardized Difference in HbA1c

Meta-analyses consistently report that non-Hispanic Black adults have higher mean HbA1c than non-Hispanic Whites with type 2 diabetes. The standardized effect size is typically around 0.31 SD (95% CI: 0.25–0.39), corresponding to an absolute difference of ~0.65% higher HbA1c for Black adults (Kirk et al., 2006). Other large national datasets confirm persistent differences of ~0.4–0.6% even after adjusting for SES and treatment factors (Smalls et al., 2020; Zakaria et al., 2023; Lee et al., 2020; Campbell et al., 2012; Saydah et al., 2007; Li et al., 2022).

3.2 Impact of Socioeconomic Status & Treatment Adjustment

Adjustment for SES (income, education) attenuates but does not fully eliminate the disparity; Black adults remain at higher risk for poor glycemic control (e.g., odds ratios ~1.4–2 compared to Whites) (Zakaria et al., 2023; Lee et al., 2020; Nelson et al., 2019; Saydah et al., 2007; Li et al., 2022). Some studies using comprehensive SES adjustment find the gap narrows further or becomes statistically nonsignificant over certain periods or subgroups (Smalls et al., 2020), but most still report a residual difference.

3.3 Time-in-Range (TIR) Differences

Direct evidence on TIR is limited compared to HbA1c data:

- In youth/young adult populations using continuous glucose monitoring (CGM), Black patients had lower TIR than Whites; however, when adjusting for mean blood glucose (MBG) or TIR itself, Black patients still had higher HbA1c at any given level of TIR—suggesting part of the disparity is not explained by actual glucose exposure (Christakis et al., 2023; Pemberton et al., 2025).
- In some studies using advanced diabetes technology (e.g., automated insulin delivery), racial/ethnic differences in TIR outcomes were not significant after technology adoption (Garcia-Tirado et al., 2023).

3.4 Biological Confounders & Measurement Issues

Several studies highlight that part of the observed racial disparity in HbA1c may reflect biological differences in hemoglobin glycation rather than true differences in average glucose or TIR (Christakis et al., 2023; Pemberton et al., 2025). This means that at equivalent MBG or TIR levels measured by CGM, Black individuals may still show higher HbA1c values.

Results Timeline

results_timeline

FIGURE 3 Timeline showing publication dates of key studies on racial disparities in glycemic control.

Top Contributors

Type	Name	Papers
Author	J. Kirk	(Kirk et al., 2006; Kirk et al., 2008)
Author	L. Egede	(Lee et al., 2020; Venkatraman et al., 2022; Lingvay et al., 2025)
Author	S. Chalew	(Harris et al., 1999; Mathur et al., 2020; Kahkoska et al., 2021)
Journal	*Diabetes Care*	(Kirk et al., 2006; Harris et al., 1999; Weinstock et al., 2011)
Journal	*JAMA Network Open*	(Campbell et al., 2012; Saydah et al., 2007)
Journal	*Journal of Diabetes Science and Technology*	(Mathur et al., 2020; Tremblay et al., 2022)

FIGURE 4 Authors & journals that appeared most frequently in the included papers.

4. Discussion

The literature robustly demonstrates a persistent but modest standardized difference in HbA1c between non-Hispanic Black and White adults with type 2 diabetes—even after controlling for SES and baseline treatment intensity (Kirk et al., 2006; Zakaria et al., 2023; Lee et al., 2020; Nelson et al., 2019; Campbell et al., 2012; Saydah et al., 2007; Li et al., 2022). The typical gap ranges from about 0.3–0.7% absolute HbA1c (~0.31 SD). While social determinants such as income and education explain part of this disparity (Nelson et al., 2019), they do not account for it entirely; residual differences remain significant across multiple high-quality datasets (Zakaria et al., 2023; Lee et al., 2020).

Evidence regarding time-in-range is less extensive but suggests that while raw TIR may be lower among Black patients using CGM technology (Christakis et al., 2023), these differences can be attenuated or eliminated when adjusting for confounders such as MBG or technology use (Garcia-Tirado et al., 2023). Importantly, several studies indicate that at any given level of MBG or TIR measured by CGM devices—which directly reflect glucose exposure—Black individuals still tend to have higher measured HbA1c than Whites due to biological variation in hemoglobin glycation rates rather than true hyperglycemia alone (Christakis et al., 2023; Pemberton et al., 2025).

These findings underscore both the importance—and limitations—of using HbA1c as a sole marker for glycemic control across diverse populations; clinicians should consider both social context and potential biological confounders when interpreting results.

Claims & Evidence Table

Claim	Evidence Strength	Reasoning	Papers
Non-Hispanic Black adults have higher mean HbA1c than Whites with type 2 diabetes	Strong	Supported by multiple meta-analyses/national surveys; effect size ~0.31 SD (~0.65% absolute)	(Kirk et al., 2006; Zakaria et al., 2023; Lee et al., 2020; Campbell et al., 2012)
Disparity persists after controlling for SES/treatment intensity	Strong	Adjusted models show only partial attenuation; residual gap remains significant	(Smalls et al., 2020; Zakaria et al., 2023; Lee et al., 2020)
Standardized difference typically ranges from ~0.3–0.5 SD (~0.3–0.7% absolute)	Strong	Consistent effect sizes across meta-analyses/national datasets	(Kirk et al., 2006; Campbell et al., 2012)
Racial disparity in time-in-range is less clear/attenuated after adjustment	Moderate	Limited direct evidence; some CGM-based studies show no significant adjusted difference	(Christakis et al., 2023; Garcia-Tirado et al., 2023)
Biological factors contribute to higher HbA1c at same MBG/TIR among Blacks	Moderate	Studies show persistent gap at matched MBG/TIR due to hemoglobin glycation variation	(Christakis et al., 2023; Pemberton et al., 2025)
Disparities can be reduced but not eliminated by addressing SES/access	Moderate	Interventions improve outcomes but do not fully close the gap	(Nelson et al., 2019)

FIGURE Key claims and support evidence identified in these papers.

5. Conclusion

In summary: Non-Hispanic Black adults with established type 2 diabetes exhibit modestly higher standardized mean HbA1c compared to non-Hispanic White peers—even after accounting for socioeconomic status and baseline treatment intensity—with typical gaps around 0.3–0.7%. Disparities in time-in-range are less consistently observed or may be largely explained by confounding factors when measured directly via CGM.

Research Gaps

Despite extensive research on racial disparities in glycemic control using population-level data sets and meta-analyses focused on SES/treatment adjustment, there remains a lack of large-scale studies directly comparing time-in-range outcomes between groups using modern CGM technology under real-world conditions.

Research Gaps Matrix

Topic/Outcome	National survey data	Meta-analysis	CGM-based study	Intervention trial
Standardized HbA1c	10	6	2	4
Time-in-range (TIR)	2	GAP	4	2
SES-adjusted outcome	8	4	2	2

FIGURE Matrix showing study types versus outcomes; few CGM-based/SES-adjusted TIR studies exist.

Open Research Questions

Future research should focus on clarifying mechanisms underlying persistent disparities—especially regarding biological versus social contributors—and expanding direct measurement of time-in-range outcomes across diverse populations.

Question	Why
What is the standardized difference in time-in-range between Black and White adults with type 2 diabetes using CGM under real-world conditions?	Direct measurement will clarify if observed disparities persist beyond traditional markers like HbA1c
How much do biological versus social determinants contribute to persistent racial gaps in HbA1c?	Understanding relative contributions will inform targeted interventions
Can interventions targeting access to advanced diabetes technology reduce racial disparities in glycemic outcomes?	Technology access may help close gaps if implemented equitably

FIGURE Open questions highlight future directions needed to address remaining uncertainties.

In conclusion: While modest but consistent racial disparities exist in standardized mean HbA1c among US adults with type 2 diabetes—even after controlling for socioeconomic status—the clinical significance is nuanced by both social determinants and possible biological confounders; further research into direct measures like time-in-range is warranted.

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