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Gillian A. Beauchamp MD

Lehigh Valley Health Network, gillian.beauchamp@lvhn.org

B Zane Horowitz MD

Esther K. Choo MD, MPH

Marna R. Greenberg DO, MPH, FACEP

Lehigh Valley Health Network, marna.greenberg@lvhn.org

Daniel A. Spyker MD, PhD

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Sex differences in Intentional Exposures Among Adolescents and Adults: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016

Gillian A. Beauchamp, MD¹, B. Zane Horowitz, MD², Esther Choo, MD, MPH², Marna R. Greenberg, DO, MPH¹, Daniel A. Spyker, PhD, MD²

¹Department of Emergency Medicine, Lehigh Valley Health Network/University of South Florida Morsani College of Medicine; ²Department of Emergency Medicine, Oregon Health and Science University

BACKGROUND

The available sex and gender-based data in suicide attempts suggests that male patients are more likely to complete a suicide attempt, and that female patients are more likely than male patients to attempt suicide by poisoning. However, little is known about overall sex differences among intentional ingestions of all kinds.

METHODS

National Poison Data System (NPDS) data was extracted for intentional exposures to pharmaceuticals, both single and multiple substance ingestions, with reasons for exposure including 'intentional - abuse', 'intentional - misuse', 'intentional - suspected suicide' and 'intentional - unknown reason', among patients aged 13-19 and aged 20-65. Exposures were included if categorized as more serious (outcome = moderate, major, or death) and reported to NPDS between Jan 1 2007 and December 31 2016. Descriptive statistics, graphical displays, linear regression, and multivariate analysis of variance were performed for exposure year and sex (male versus female) using SAS JMP version 12.0.1 (Cary NC).

CONCLUSIONS

Females were more likely to have an intentional ingestion with serious outcomes reported to the NPDS during the time period 2007-2016. Identifying sex-based differences in intentional toxicological exposures may help inform sex-specific approaches to the care of the poisoned patient, as well as to poisoning prevention efforts.

RESULTS

For 2007-2016, NPDS reported 206,306 intentional exposures with more serious outcomes for age 13-19 y/o; of which 65.1% were suspected suicide, 25.4% abuse, 5.62% misuse and 3.97% unknown. NPDS likewise reported 795,989 age 20-65 y/o; of which 72.8% were suspected suicide, 15.2% abuse, 6.84% misuse and 5.18% unknown. Exposures were consistently increasing over this decade at a rate of 1 to 8% per year ($p < 0.0001$). From the multivariate analysis of 13-19 y/o, R^2 was 0.988, LogWorth for sex was 11.5 and for year 10.8 ($p < 0.0001$) with a female:male ratio of 1.43. From the multivariate analysis of 20-65 y/o, R^2 was 0.952, LogWorth for sex was 10.7 and for year 7.65 ($p < 0.0001$) with a female:male ratio of 1.17.

Fig. 1: Intentional Exposures among Adolescents Ages 13-19 Years, by Sex, Over Time: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.

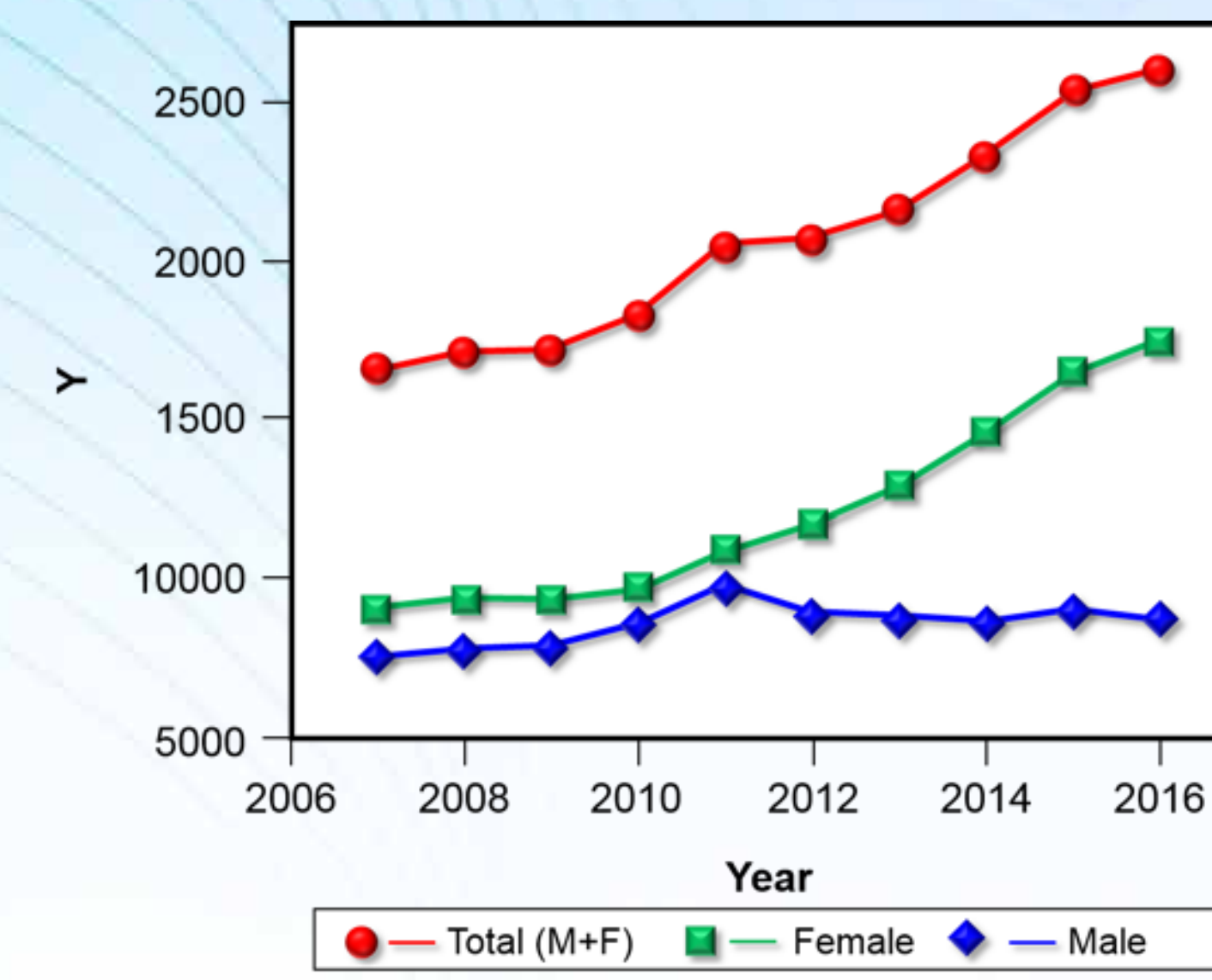


Fig. 2a: Bivariate Fit of Intentional Exposures/Year among Female Adolescents Ages 13-19 Years: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.

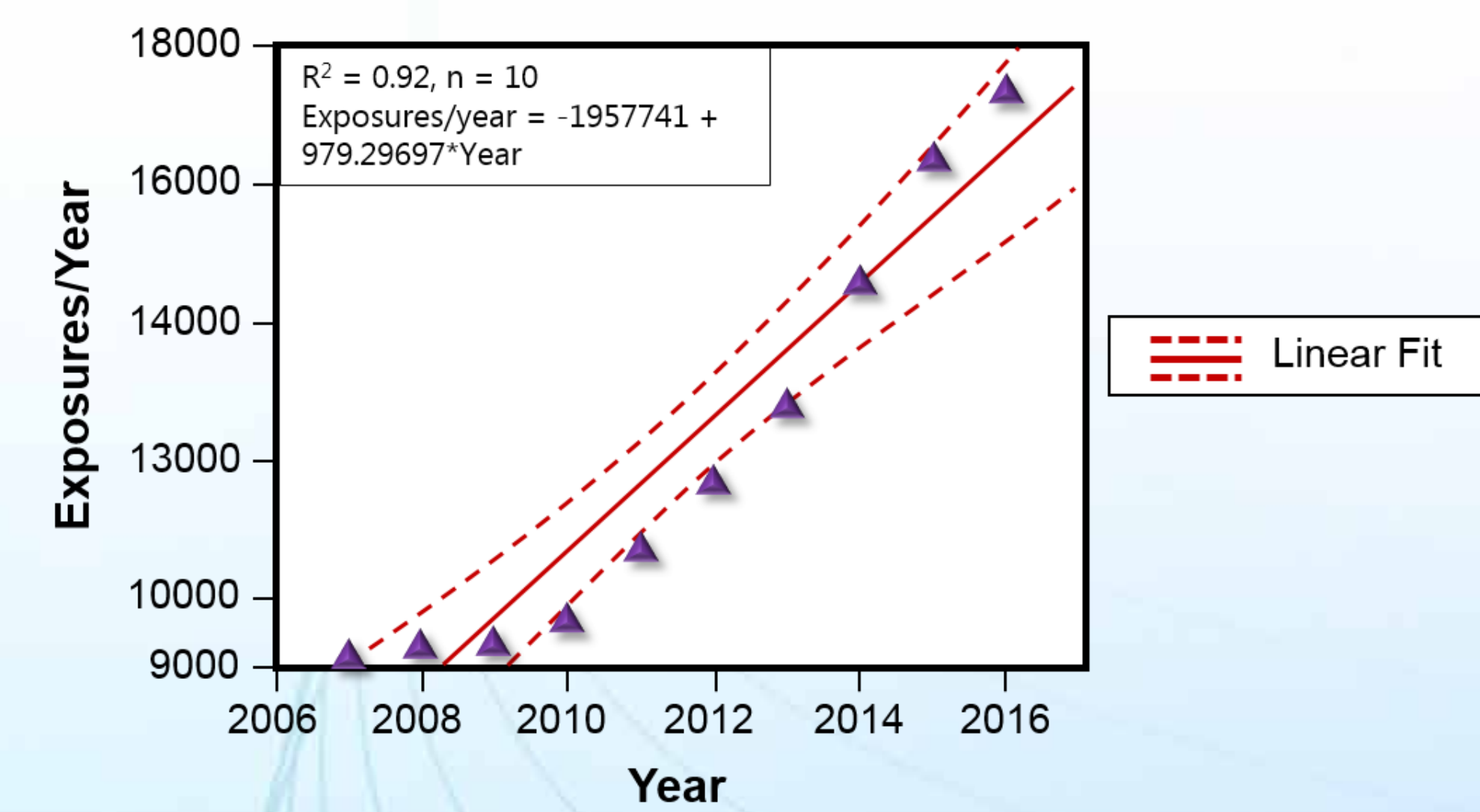


Fig. 2b: Bivariate Fit of Intentional Exposures/Year among Male Adolescents Ages 13-19 Years: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.

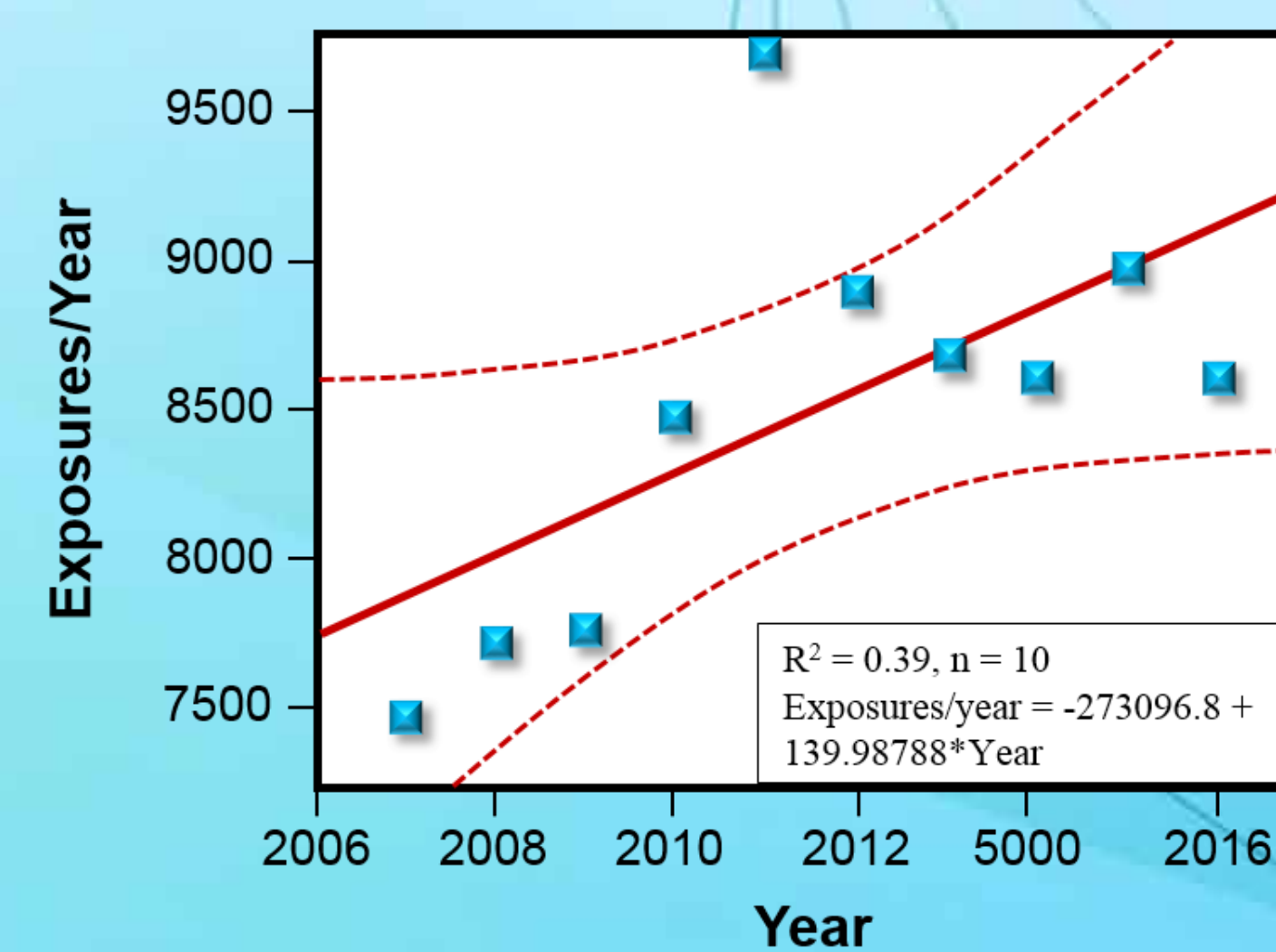


Fig. 2c: Bivariate Fit of Intentional Exposures/Year among Male Adolescents Ages 13-19 Years: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.

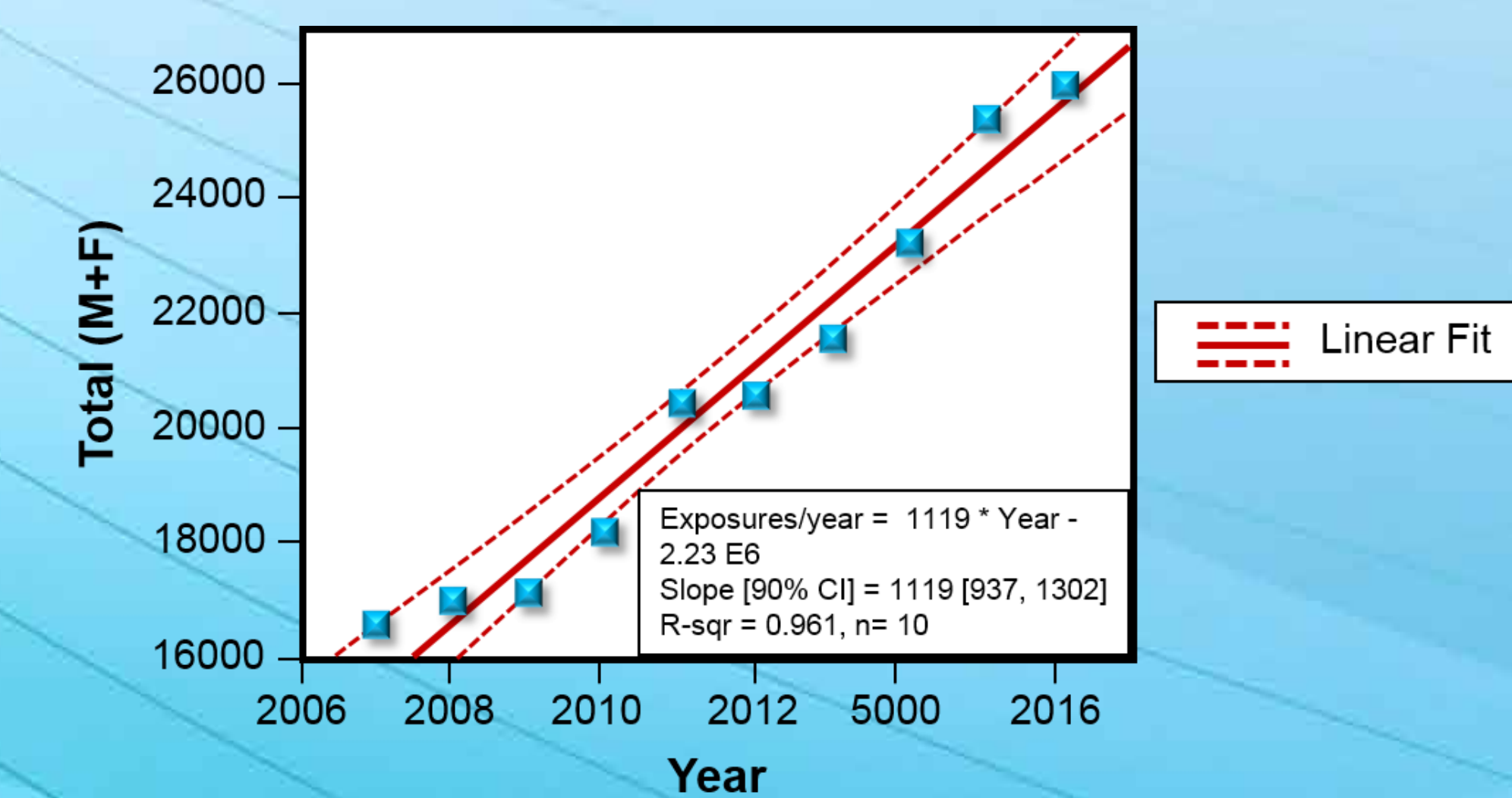


Fig. 3: Multivariate Regression Model Plot for Exposures/Year vs. Sex and Reporting Year for Intentional Exposures among Adolescents Age 13-19 Years (Effect Summary & Actual by Predicted Plot).

Fig 3a: Effect Summary

Source	LogWorth	PValue
Gender	11.483	0.00000
Year	10.774	0.00000
Year*Gender	9.103	0.00000
Year-sqrd*Gender	5.129	0.00001
Year-sqrd	1.823	0.01503

Fig 3b: Actual by Predicted Plot

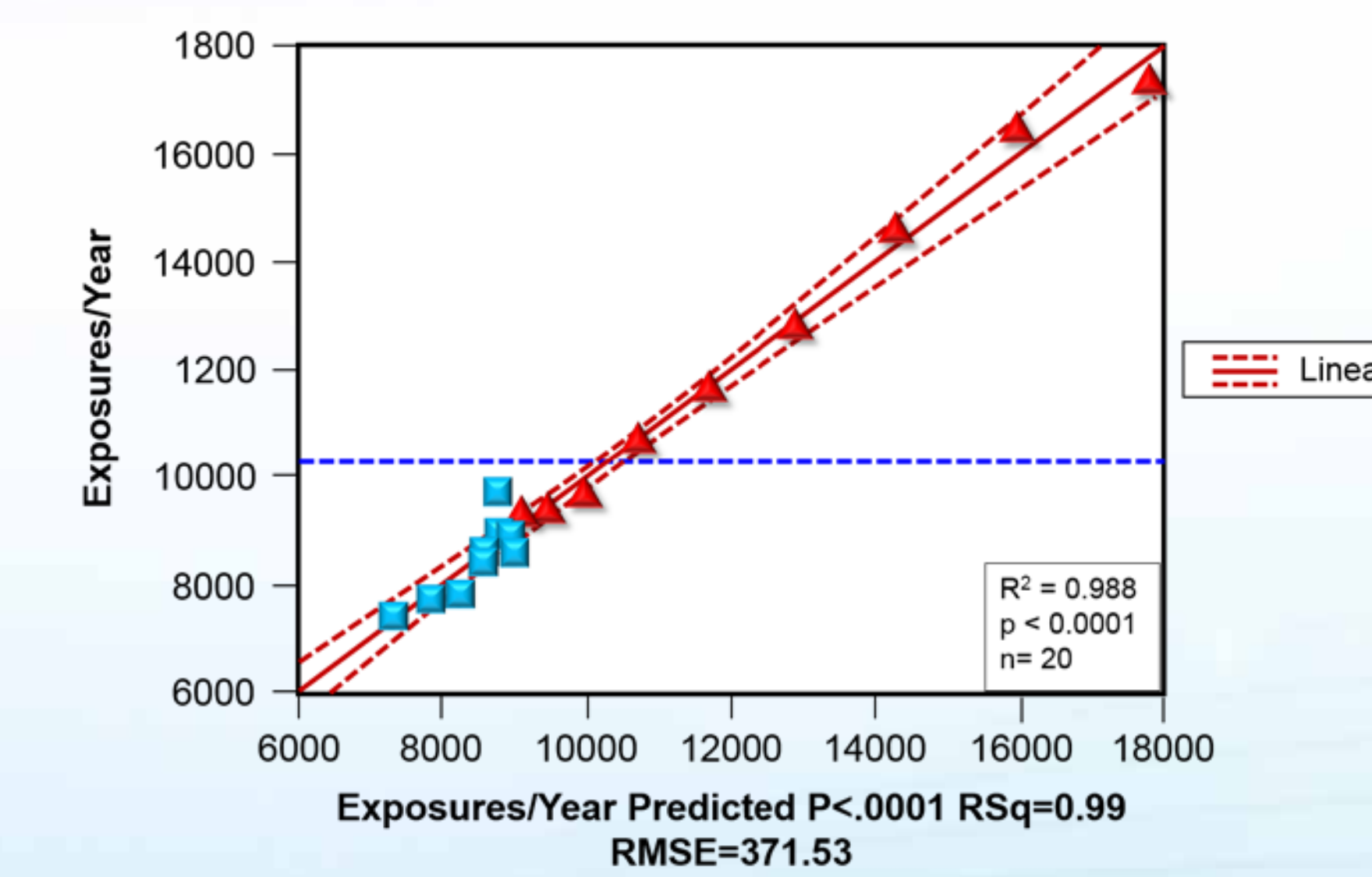


Fig. 4: Intentional Exposures among Adults Ages 20-65 Years, by Sex, Over Time: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.

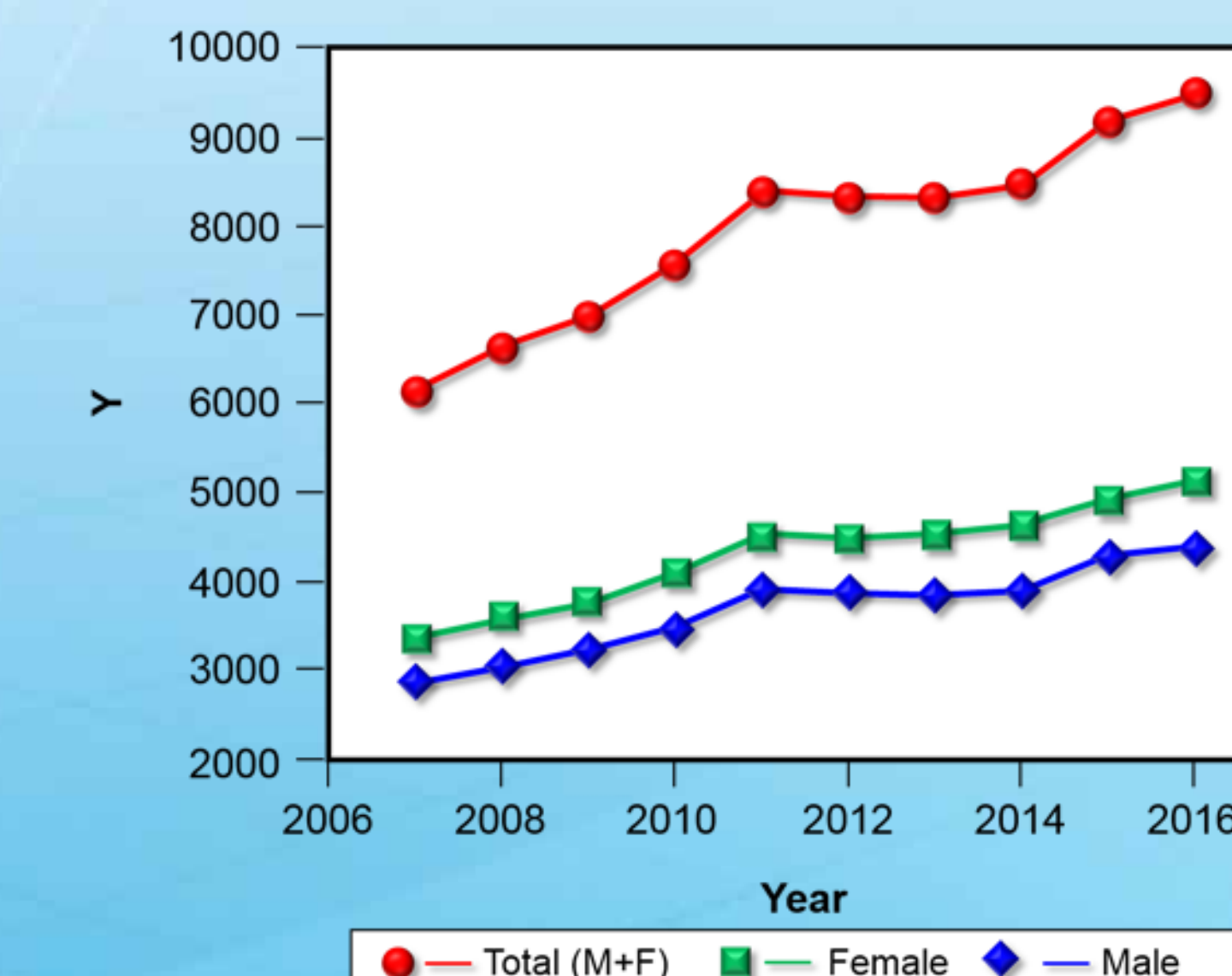


Fig. 5a: Bivariate Fit of Intentional Exposures/Year among Female Adults Ages 20-65 Years: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.

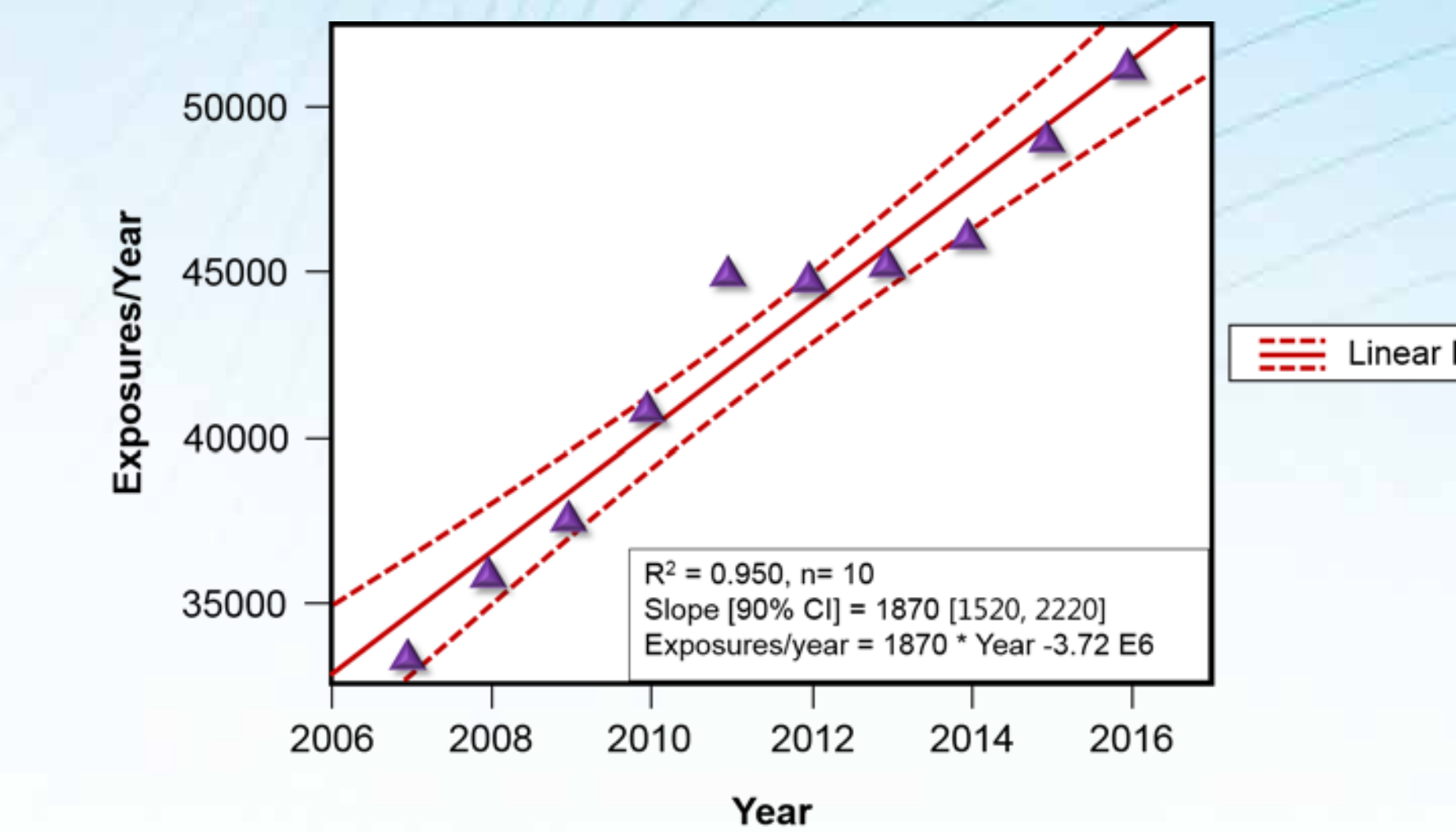


Fig. 5b: Bivariate Fit of Intentional Exposures/Year among Male Adults Ages 20-65 Years: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.

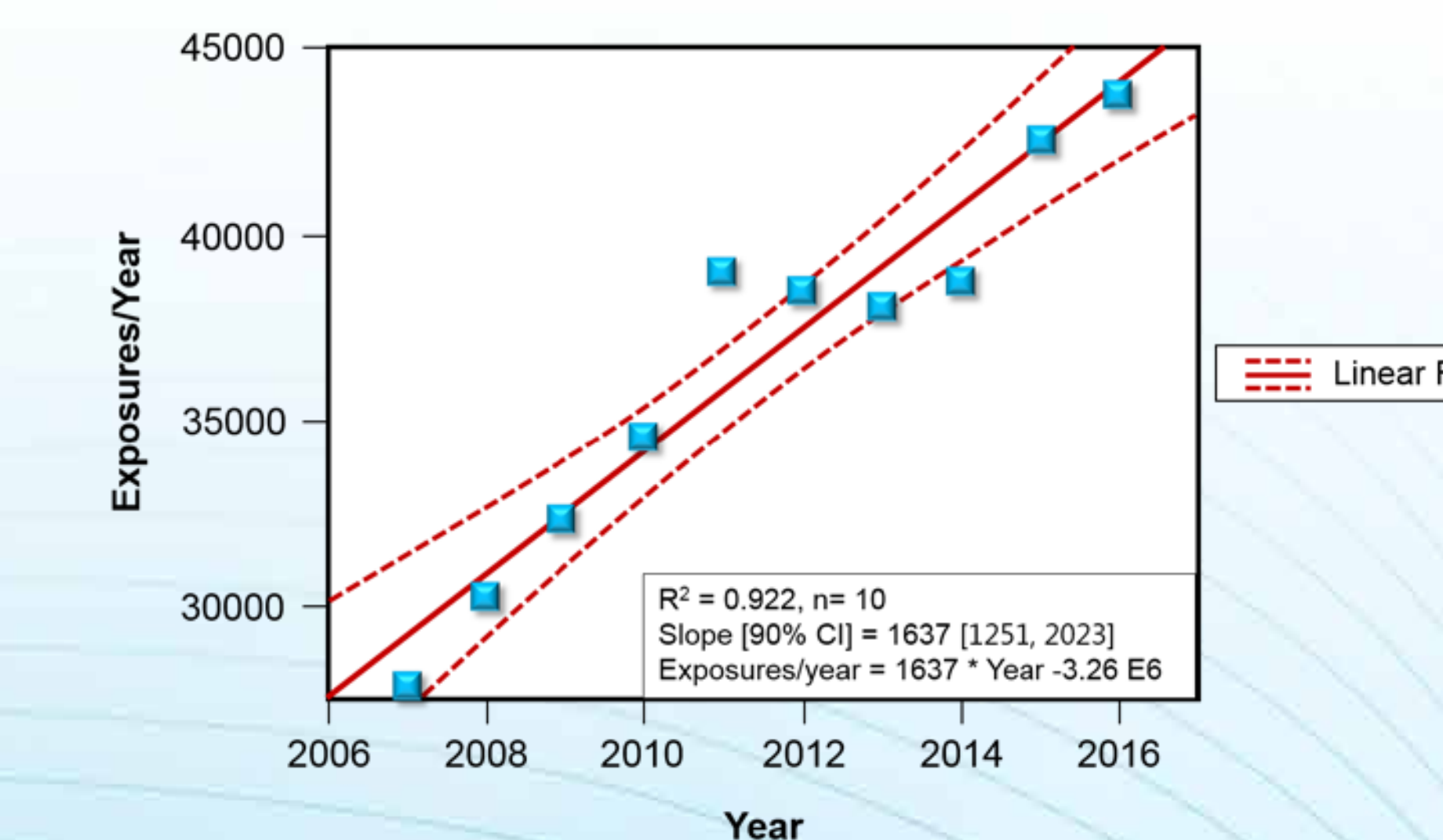


Fig. 5c: Bivariate Fit of Intentional Exposures/Year among All Adults (Females + Males) Ages 20-65 Years: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.

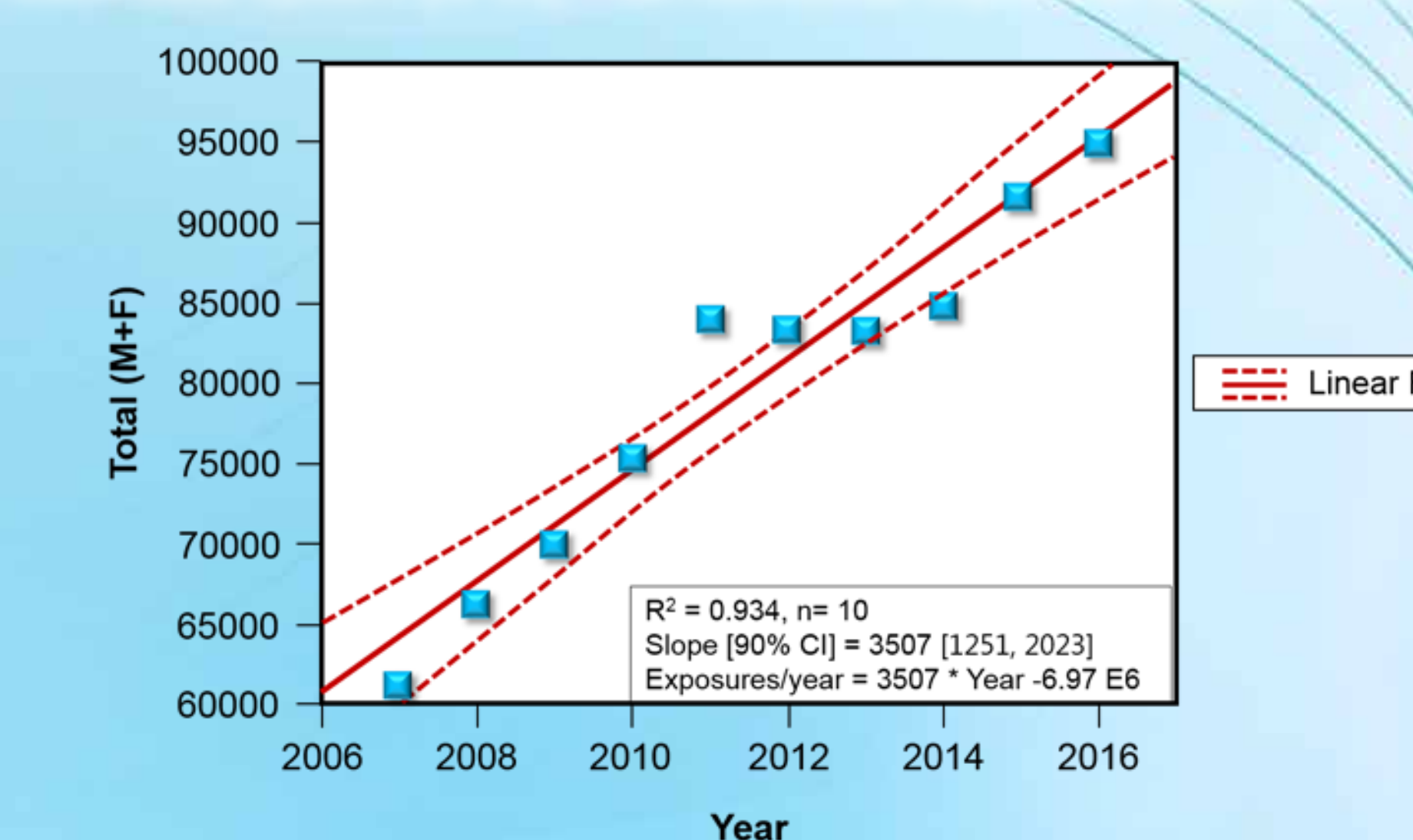
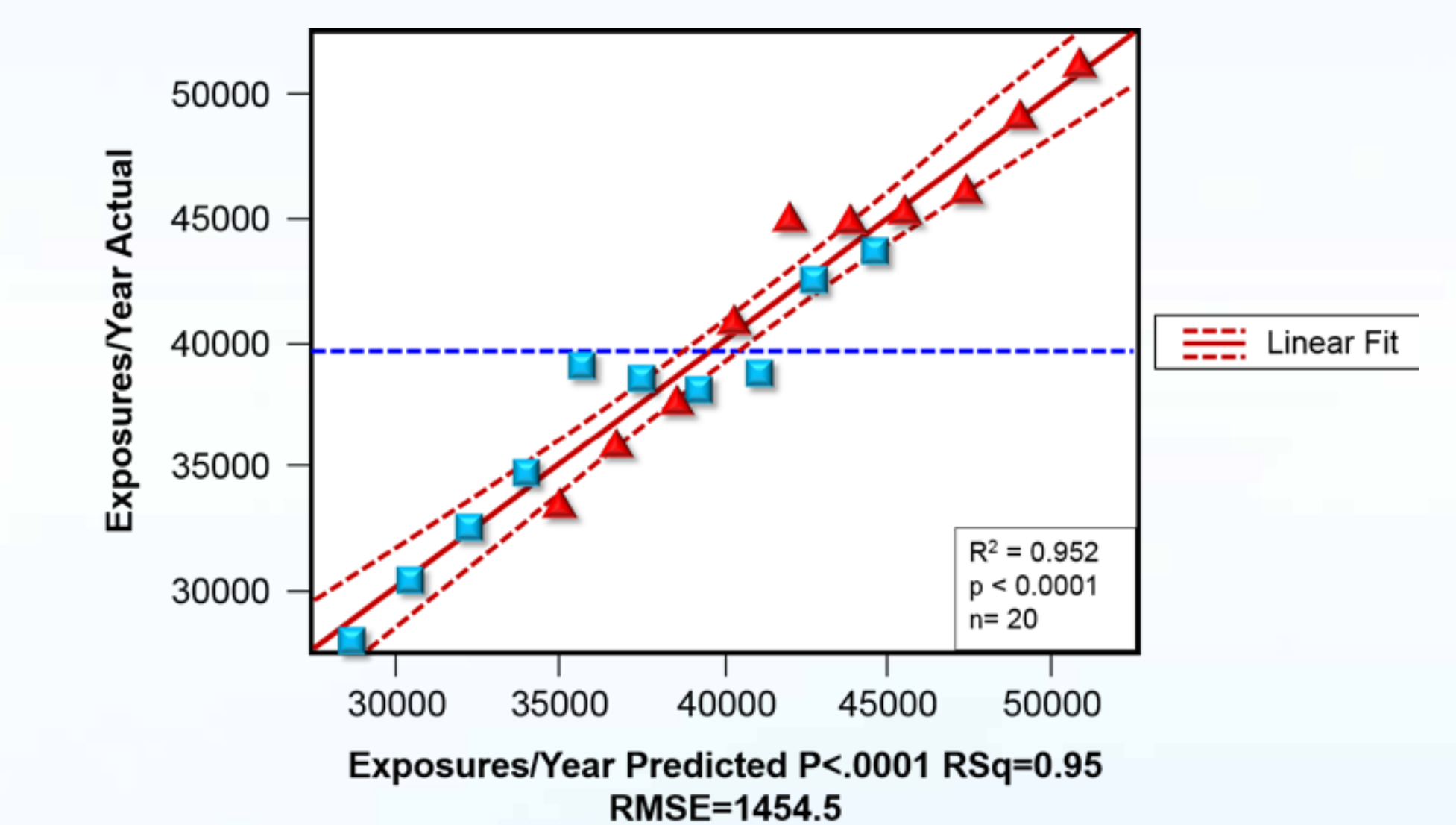


Fig. 6: Multivariate Regression Model Plot for Exposures/Year vs. Sex and Reporting Year for Intentional Exposures among Adults Ages 20-65 Years (Effect Summary & Actual by Predicted Plot).

Fig 6a: Effect Summary

Source	LogWorth	PValue
Gender	7.646	0.00000
Year	10.729	0.00000

Fig 6b: Actual by Predicted Plot



Age Group	All Exposures over time	Exposures mean/year	Slope and 95% Confidence Interval			
			%/year	#/year	95% CI	Rsquare
13-19 y/o	Females	12,115	8.08%	979	[741, 1,218]	0.918
	Males	8,489	1.65%	140	[-1.79, 282]	0.393
	Males+Females	20,603	5.43%	1,119	[937, 1,302]	0.961
20-65 y/o	Females	42,911	4.36%	1,870	[1,520, 2,220]	0.950
	Males	36,572	4.48%	1,637	[1,251, 2,023]	0.923
	Males+Females	79,483	4.41%	3,507	[2,777, 4,237]	0.939

Table 1: Intentional Exposures among Adolescents and Adults by Sex: A Retrospective Review of National Poison Data System (NPDS) Pharmaceutical Exposures 2007-2016.