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Older cyclists and e-bike riders - What's same, what's different?

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Types of e-bikes in Germany

Pedelec (Pedelec25)

- Support up to 25 km/h
- 99 % e-bikes sold in Germany (ZIV, 2019)



S-Pedelec (Pedelec45)

- Support up to 45 km/h
- No use of bicycle infrastructure





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Introduction

Pedelec and bicycle crashes



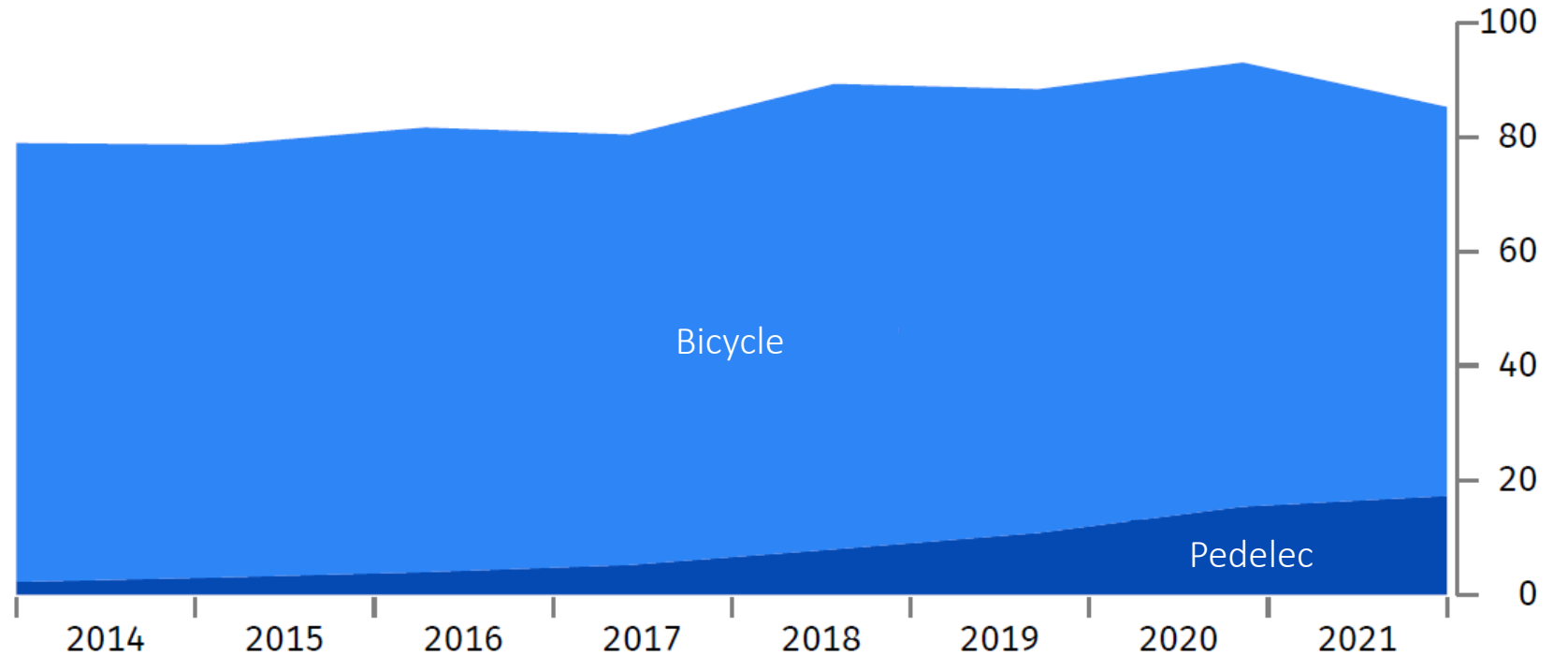
Germany has one of the highest death rates in the EU for cyclists (PIN report, 2023)



2014:	2021:
2,245	17,285



2014:	2021:
76,643	67,931

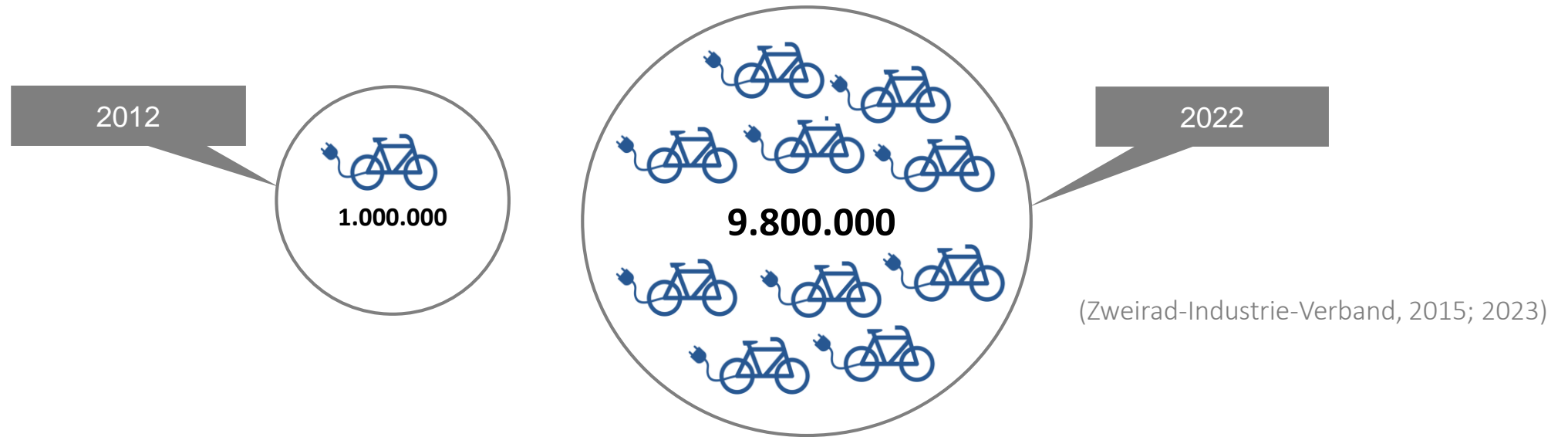


© Statistisches Bundesamt (Destatis), 2022

Figure from Statistisches Bundesamt [Destatis]. (2022). Die neue Zweirad-Mobilität: Zum Unfallgeschehen mit Pedelecs und E-Scootern“ Online-Pressesgespräch 12.07.2022.



Introduction e-bikes (pedelecs)



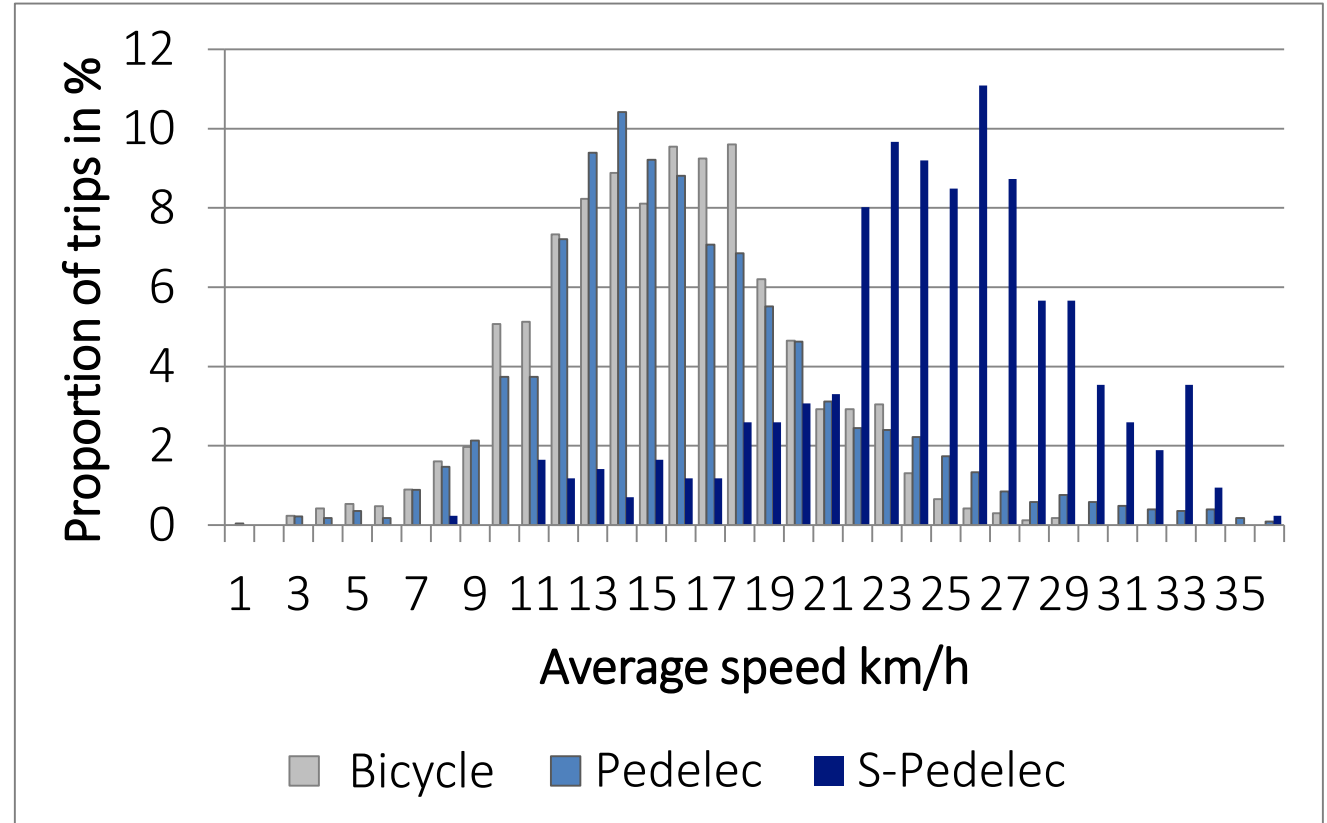
- Pedelecs are especially popular with older users (Gaster, 2021; Schepers et al., 2020)
- Road safety concerns → higher speeds, higher weight



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How fast are pedelec riders compared to cyclists?

	<u>Bicycle</u>	<u>Pedelec</u>	<u>S-Pedelec</u>
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
Age groups	<i>Speed</i>	<i>Speed</i>	<i>Speed</i>
≤ 40 years	16.6	20.5	23.4
41-64 years	15.8	17.5	25.1
≥ 65 years	13.9	14.8	-
Total	15.3	17.4	24.5



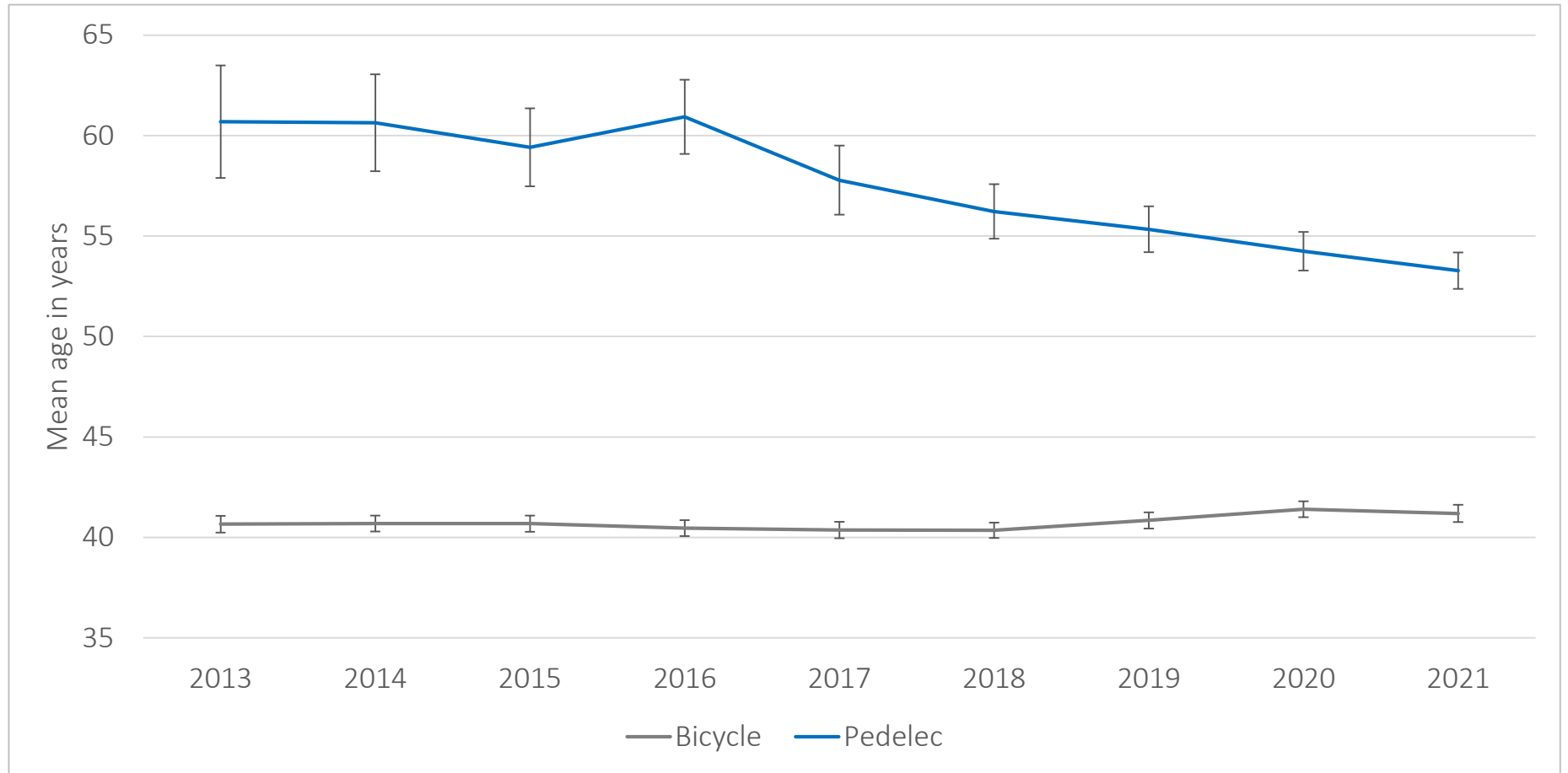
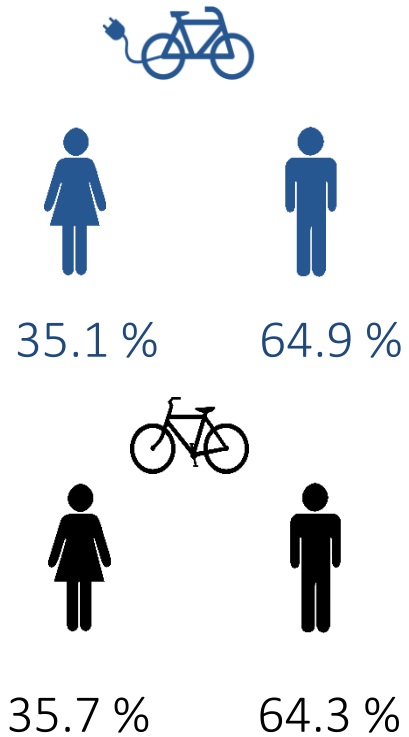
Schleinitz, K., Petzoldt, T., Franke-Bartholdt, L., Krems, J., & Gehlert, T. (2017). The German Naturalistic Cycling Study - Comparing cycling speed of riders of different e-bikes and conventional bicycles. *Safety Science*, 92, 290-297 doi:10.1016/j.ssci.2015.07.027





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Crashes: Gender and age of the riders

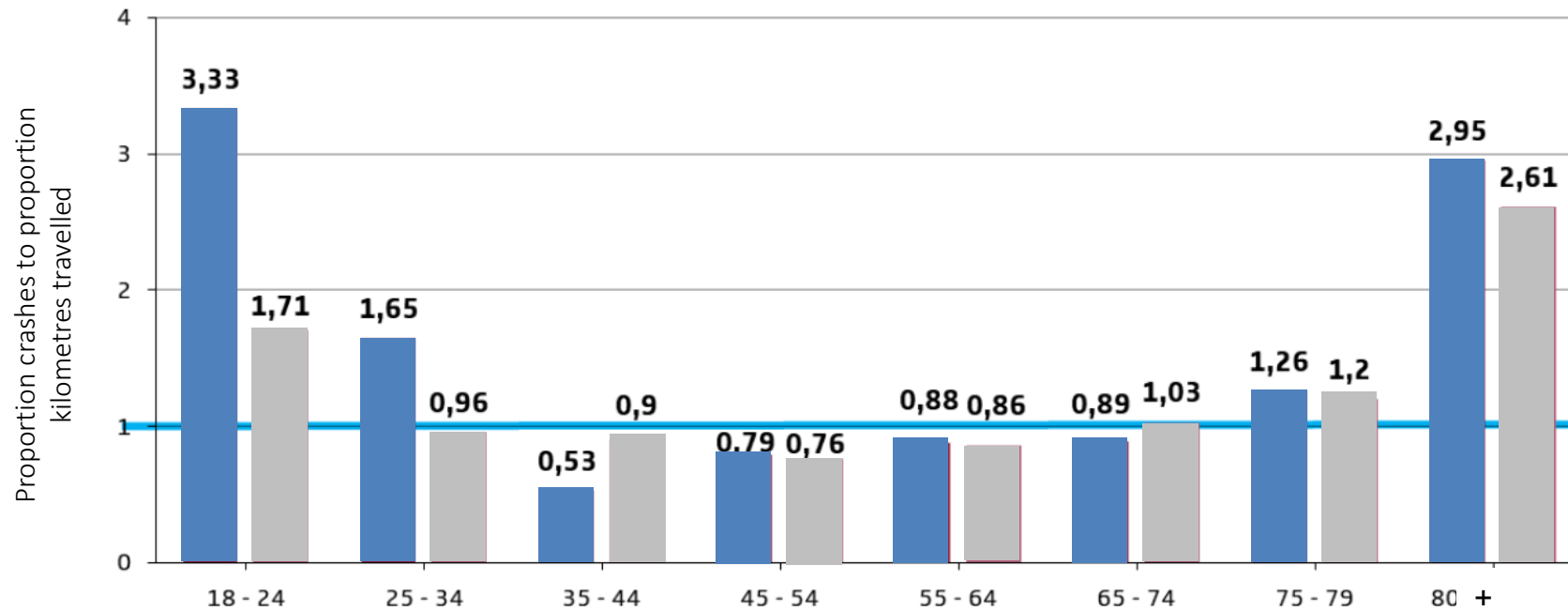


Schleinitz, K., & Petzoldt, T. (2023). Development of German pedelec (and bicycle) crashes between 2013 and 2021. *Journal of Safety Research*. <https://doi.org/10.1016/j.jsr.2023.09.016>



Crash risk for different age groups

Crash risk when pedelec riders and cyclists caused the crash



Gesamtverband der Deutschen Versicherungswirtschaft e. V.

Forschungsbericht Nr. 81

Unfallrisiko von Pedelec-Fahrer:innen

Kristina Gaster
Tina Gehlert

Unfallforschung
der Versicherer
GDV

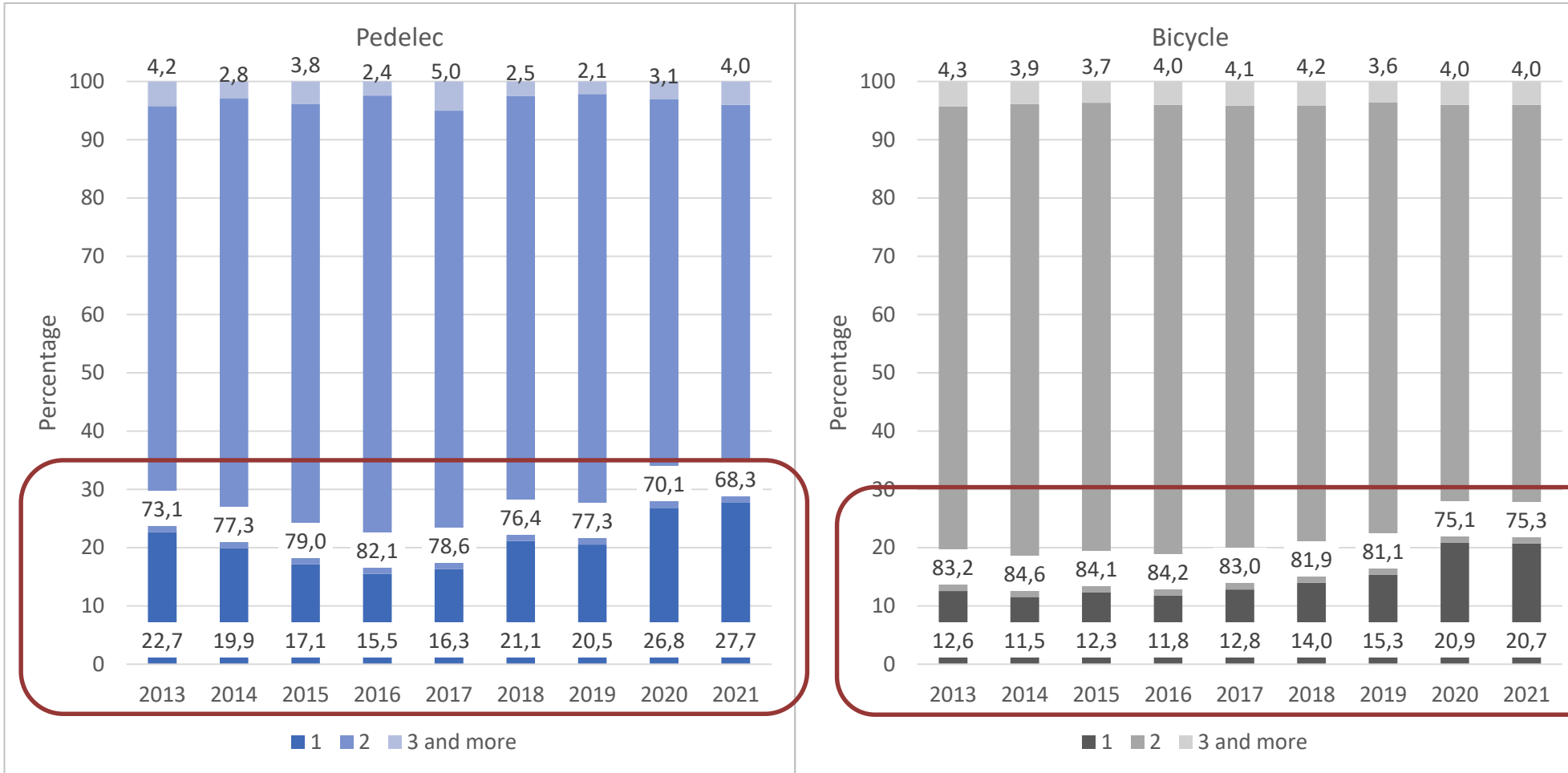
Figure from Gaster, K., & Gehlert, T. (2022). *Unfallrisiko von Pedelec-Fahrer:innen* (Forschungsbericht Nr. 81). Unfallforschung der Versicherer.





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Results – Number of conflict partners

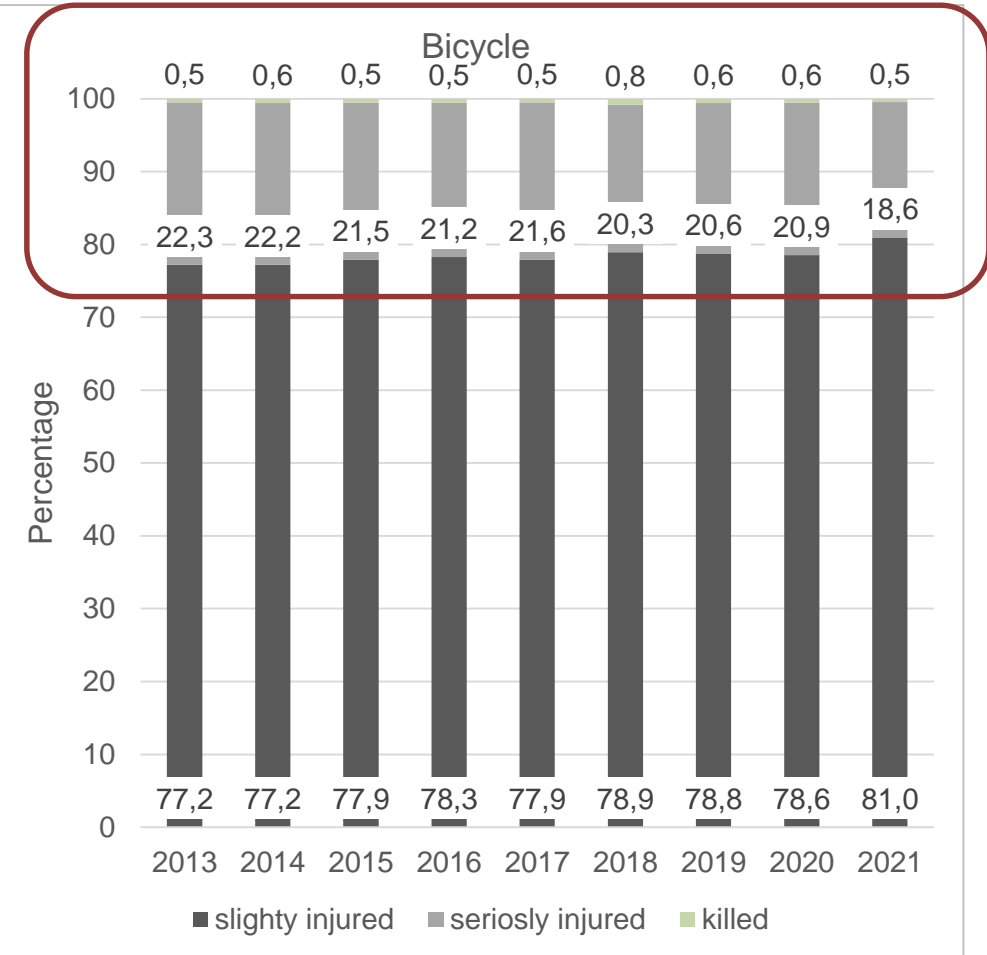
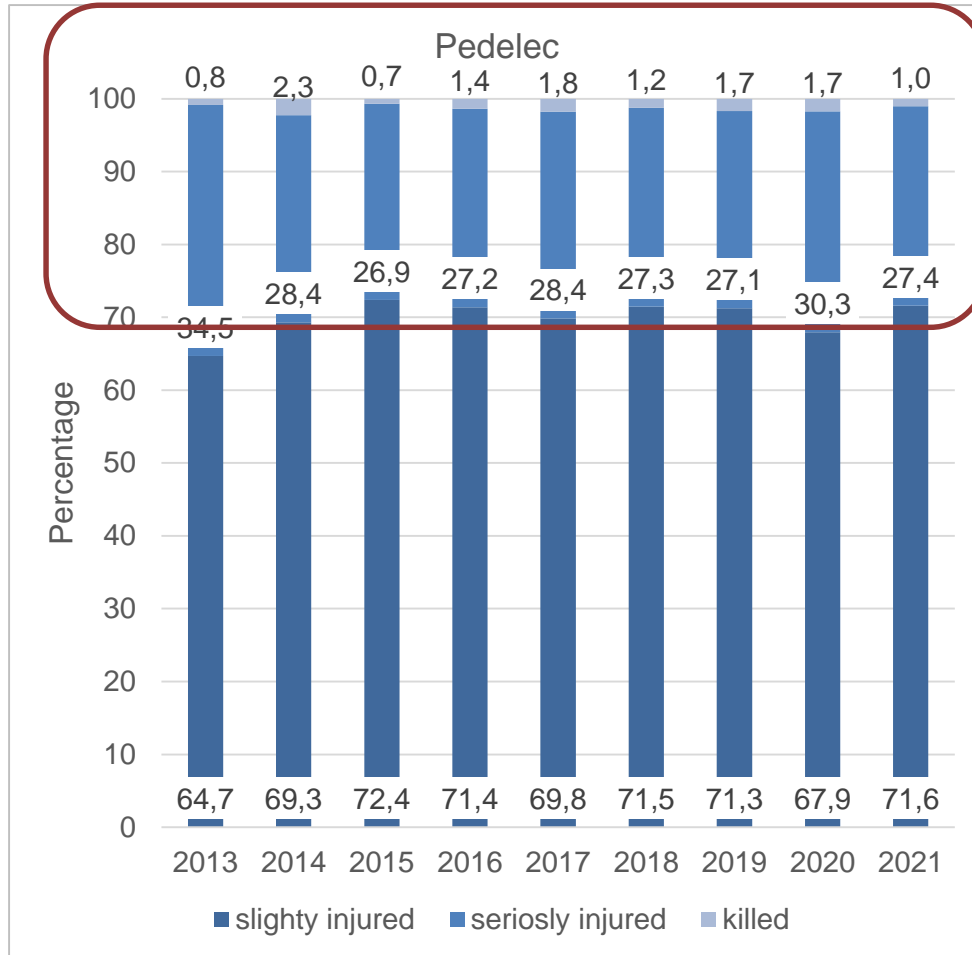


65+
Pedelec:
 26.0% single accidents of all crashes
 65+
Cyclists:
 18.8% single accidents

Schleinitz, K., & Petzoldt, T. (2023). Development of German pedelec (and bicycle) crashes between 2013 and 2021. *Journal of Safety Research*.
<https://doi.org/10.1016/j.jsr.2023.09.016>



Injury severity



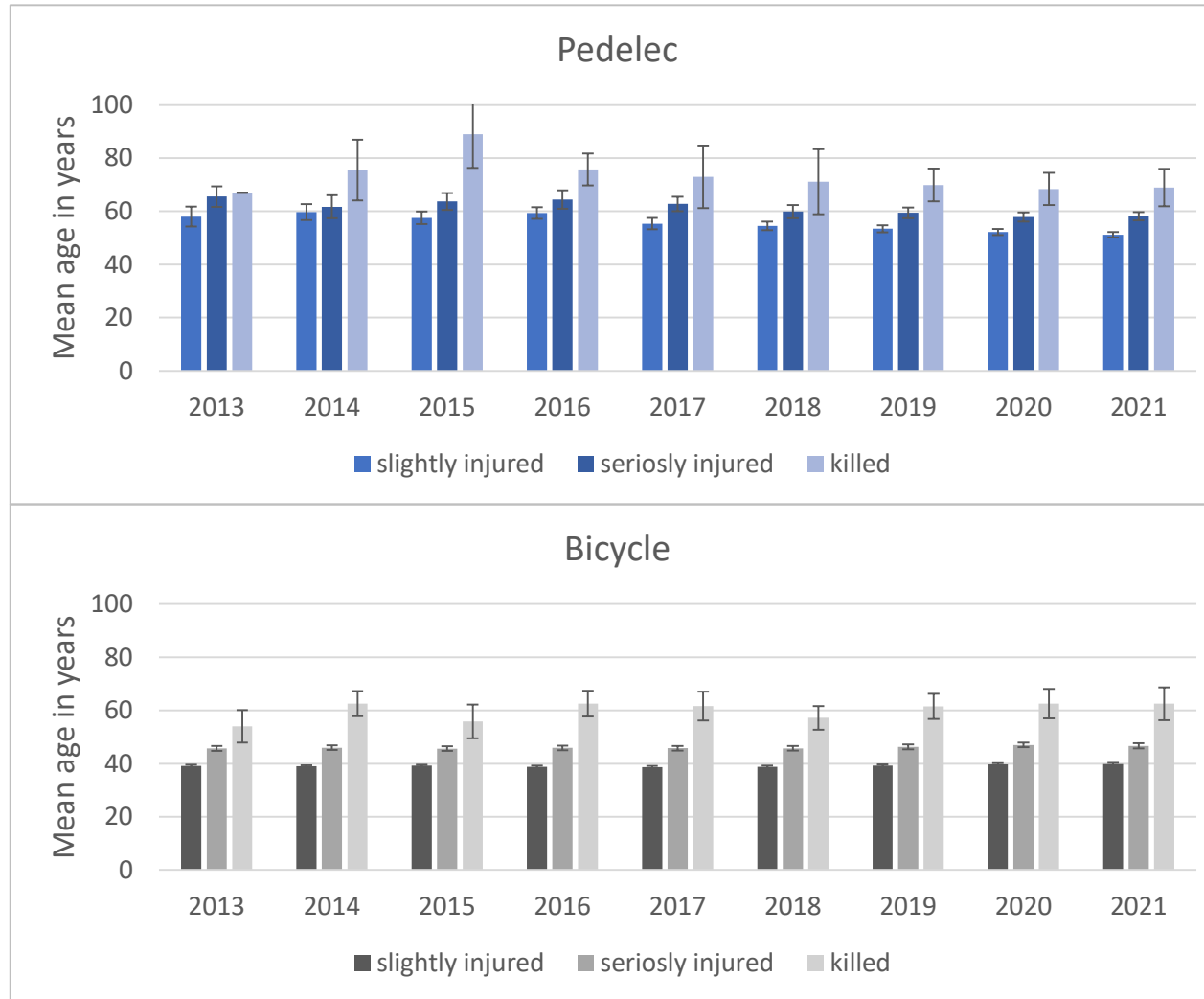
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Age and injury severity



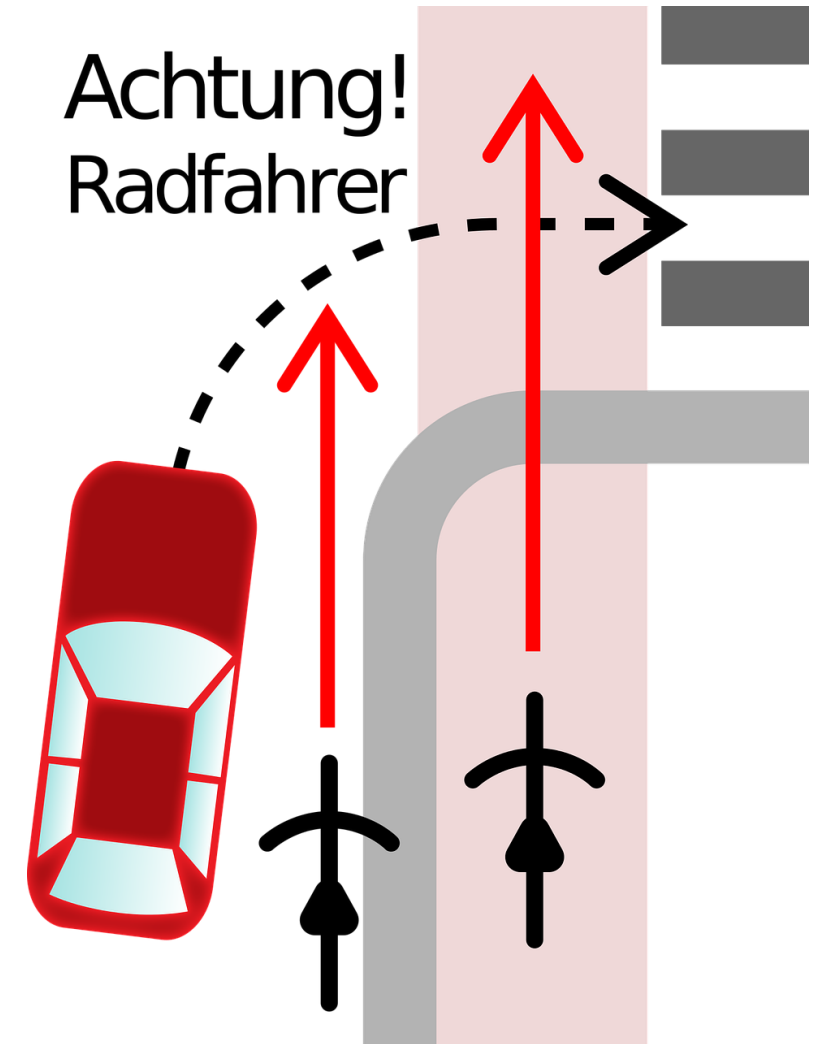
Higher chance of a serious or fatal injury higher for a pedelec rider compared to a cyclist after controlling for age, gender and other factors.

Schleinitz, K., & Petzoldt, T. (2023). Development of German pedelec (and bicycle) crashes between 2013 and 2021. *Journal of Safety Research*. <https://doi.org/10.1016/j.jsr.2023.09.016>



Typical scenarios and crash type

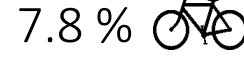
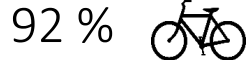
- Often conflicts at intersections comparable to cyclists
(Dozza et al., 2016; Petzoldt, Schleinitz, Heilmann, & Gehlert, 2017)
 - Most frequent type turning into accidents
(Gehlert et al., 2018; Schleinitz et al., 2023)
- Other road users underestimate the speed of a pedelec rider and choose smaller gaps for turning, (Petzoldt, Schleinitz, Krens, & Gehlert, 2017)
 - Effect more pronounced for older riders
(Schleinitz, Petzoldt, Krens, Kühn, & Gehlert, 2015)
- Reasons: visual effect e. g. pedalling frequency is lower for pedelecs, but rides faster than bicycles
(Schleinitz, Petzoldt, Krens, & Gehlert, 2016)



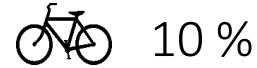
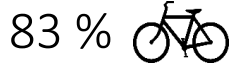


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Situational factors



(Schleinitz et al., 2023)



(Fyhri et al., 2019; Schleinitz et al., 2023)

(Gehlert et al., 2018; Schleinitz et al., 2023)

Conflict partner:



(Dozza et al., 2016; Petzoldt et al., 2017, Schleinitz et al., 2023)

Crash causation

Rider failure higher for pedelec riders as well as inappropriate speed compared to cyclists (Schleinitz et al., 2023)



Measurements

Training for cyclists and pedelec riders

Expansion of bicycle infrastructure



Promotion of wearing a bicycle helmet



Retroreflective clothes



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Thanks for your attention



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