Phone-Related Distracted Walking Injuries as a Function of Age and Walking Environment

Haolan Zheng; Isabella M. Campbell; Wayne C.W. Giang*
Department of Industrial and Systems Engineering, University of Florida, Gainesville, FL, USA

Using phones while walking has been a factor that has led to accidents and injuries. However, few studies have analyzed the propensity of injuries due to distracted walking for different age groups and in different types of walking environments. This study aims to examine the number of emergency department (ED) visits due to distracted walking across different age groups and walking environments using a publicly available dataset, the National Electronic Injury Surveillance System (NEISS) database. The results suggest that there were an estimated 29140 distracted walking injuries between the years 2011-2019. Individuals between 11 and 20 years old had the most injuries, followed by 21 to 30, and 31 to 40. Furthermore, the proportion of estimated injuries that occurred in different walking environments differed across age groups. Safety-orient interventions for future research for stairs and home environments were also recommended in the present study.

INTRODUCTION

Cellphone ownership has increased in the US over the last decade. In 2010, about 80% of American adults owned a cellphone, while in 2019, this proportion had increased to 96% (Pew Research Center, 2019). Studies have shown that people are now spending more than two and a half hours on the phone every day (Andone et al., 2016; Deng et al., 2019), suggesting that daily exposure to phone use is very high.

Due to the ubiquity of cellphones and smartphones, people often use these devices while also engaging in other tasks such as driving or walking. In general, using cellphones during dual-task conditions has been considered as unsafe behavior. For example, in the driving context, numerous studies have shown the increased risk of accidents due to texting while driving (Centers for Disease Control and Prevention, 2020). Engagement with cellphones can shift drivers' visual attention (Wang et al., 2017), increase their reaction time (Caird et al., 2008), and increase crash risks in general (Gershon et al., 2019). To mitigate these potential hazards, laws and regulations have been put in place to reduce driver's engagement with phone distractions (Governers Highway Safety Association, 2021).

In comparison to distracted driving, distracted walking has received less attention. Researchers have found that roughly 20 – 25 % of pedestrians were distracted by technology products (Barkley and Lepp, 2016; Basch et al., 2014; Thompson et al., 2013). Distracted pedestrians are more likely to have reduced situational awareness (Nasar, Hecht, & Wener, 2008), exhibit decrement in gait performance (Lamberg and Muratori, 2012; Russo et al., 2018), and have more near collisions with others (Hyman et al., 2010) compared to the individuals who are not distracted. Furthermore, as suggested by Smith et al. (2013) and Nasar et al. (2013), walking injuries caused by phone distractions have been increasing since 2000, and this trend is expected to continue in the future. These findings suggest that more research is needed to better understand the factors that contribute to phone-related distracted walking injury.

Age is one factor that may influence the frequency of phone-related distracted walking injuries. Anderson and Perrin (2017) found that cellphone ownership among adults over 65 had increased to 80% in late 2016. However, much of the research on distracted walking has focused on younger participants (Hyman et al., 2010; Schwebel et al., 2012; Tian et al., 2018). Older individuals are likely to suffer from poorer locomotor performance (Nigg et al., 1994), and may have a harder time during distracted walking conditions (Hollman et al., 2007). These physical decrements lead to more walking injuries for older adults over 65 compared to adults below 65 (O'Hern et al., 2015). Age is also likely to be a factor in changing individuals' phone usage patterns. Studies have shown that on average, younger adults spend more time on phones every day compared to older adults. Younger adults consider multimedia apps as the phone's primary using purpose while older adults still prefer to use calling functions (Andone et al., 2016; Forgays et al., 2014; Sarraute et al., 2014). Thus, the effects of age on distracted walking injuries are complex since it can affect both the risk of injuries (e.g., motor control difficulties) and exposure to risky behavior (e.g., amount of phone distraction).

The walking environment is another factor that may impact the risk of injuries due to distracted walking. Previous studies have mainly focused on street and intersection environments, (Basch et al., 2014; Russo et al., 2018), however, distracted walking also occurs in other types of walking environments, such as pedestrian plazas, hallways, or stairwells. The types of hazards are likely to differ based on the type of environment where distracted walking occurred. Different types of walking environments have different walking surfaces, different users of the space (i.e., vehicles, bikes, or pedestrians), and various layouts (e.g., barriers). Hence, investigating the number of injuries related to distracted walking that occur in different environments can help target efforts to improve walkers' safety.

Both age and walking environment may impact the prevalence of phone-related distracted walking injuries. However, it is also hypothesized that the effect of the walking environment will differ between age groups. Individuals in different age groups use their phones for different reasons (e.g., gaming, texting, talking on the phone, navigation) leading to differences in where they choose to engage in distracted walking behavior. Furthermore, older adults may also exhibit self-regulating behavior, reducing their engagement with distractions in dangerous environments due to increases in the difficulty of locomotor control. Similar results have been found in contexts of distracted driving, where older adults are less likely to engage in distracted driving than younger adults (Pope et al., 2017), and they also reduce their exposure to dangerous driving environments (Barrett and Gumber, 2019).

Therefore, the present paper investigates the number of distracted walking-related injuries across different ages and walking environments by examining the following questions: 1) Do phone-related distracted walking injuries differ amongst different age groups? 2) Within each age group, what is the percentage of injuries that occurred in different walking environments, and do the proportion of injuries change across different age groups?

METHODOLOGY

Database Overview

The estimated number of distracted walking injuries in each age group and walking environment was examined using the National Electronic Injury Surveillance System (NEISS) database. Each year, US Consumer Products Safety Commission (CPSC) estimates the injuries caused by consumer products based on emergency department (ED) visits from a stratified sample of 100 US hospitals. The NEISS database records information for each visit, including the patient's age, gender, ethnic group, date and location of where the injury occurred, injured body part, disposition (the outcome of ED visit), and a two-line narrative that briefly summarizes the incident. A numeric weight, based on hospitals' size, strata, and geographic location, is assigned to each entry in the database to assist with estimating the total number of injuries in the US-based on the methodology specified by NEISS (U.S. Consumer Product Safety Commission, 2019). Results in this paper will be based on national estimates.

Selection of Cases

Injuries that were associated with phones and phone accessories (NEISS product code #0550) from 2011 to 2019 were queried using the NEISS Query Builder website (US CPSC, 2020). Two of the authors independently coded the dataset. First, individual cases from the NEISS query were screened by evaluating if the patient was injured due to walking while being distracted by a phone based on the two-line NEISS narrative. Cases due to distracted walking injuries were defined by the following: 1) the injury must have been due to a visual, manual, auditory, or cognitive distraction on phone; 2) the injury must have been due to phone distraction while walking; 3) the phone could be a smartphone or non-smartphone. Other types of injury cases, such as distracted biking or distracted driving, were excluded from the analysis. Any injuries due to being hit by a phone or injuries that occurred while rushing to answer the phone were also excluded.

Second, all selected cases were further categorized based on the environment where the accident occurred (definitions in Table 1). Each case was assigned to a single environment (mutually exclusive) based on both the two-line narrative and NEISS location variables. The present study adopted many of the locations from the original NEISS database, with the addition of two new environments: stairwell and sidewalk. The inter-rater reliability for distracted walking classifications and location classifications were both good (K_1>.80; K_2>.85, respectively). Age was categorized into 8 groups (Table 2) based on the categorization used in Smith et al. (2013).

Table 1. Walking Environment Categories

Locations	Definition
Home	Injuries that occurred within an apartment, house, townhouse, or any other kinds of residential buildings, but excluding injuries that occurred on stairs.
Public	Injuries that occurred in public environments (i.e., parking lot, pedestrian plaza, shopping mall, etc.), but excluding streets, sidewalks, and stairs.
Stairwell	Injuries that occurred on stairs (e.g., indoor/outdoor, public/private).
Street	Injuries that occurred when individuals were on a street (i.e., intersections, highway), excluding sidewalks.
Sidewalk	Injuries that occurred in sidewalk environments (usually beside a street or house) that are mainly designed for the pedestrians, excluding any stairs.
Others	The other category includes injuries that occurred in environments not covered in the previous definitions including mobile (e.g., manufactured home), industrial (e.g., factory, warehouse, etc.), school (e.g., daycare facility, college, etc.), and sports field (e.g., stadium, etc.).
Unknown	Cases without enough information in either narratives or NEISS location field to categorize.

RESULTS

A total of (n = 730) cases of injuries due to distracted walking were identified from the NEISS dataset between 2011 and 2019, which corresponds to a national estimate of 29,140 estimated injuries in the US during that period. Home, stairwell, and public areas were the three environments with the most injury cases (excluding unknown location). The age group with the largest number of injuries was between 11 to 20, followed by the age group between 21 to 30, and 31 to 40. A larger percentage of females were injured due to distracted walking than males (F: 63%; M: 37%), which may have been driven by higher daily phone use by females (Andone et al., 2016). Over 90% of the patients were treated and released from ED, with only 15 estimated cases of fatality. Incident characteristics are detailed in Table 2.

Estimated injury cases broken down by walking environments and age group are shown in Figure 1. Two peaks can be observed from the figure. Individuals between 11 and 20 had the most injury cases compared to the other age groups. When age increased, the estimated injuries due to distracted walking decreased. However, there was an exception for individuals over 71 years who had more estimated injury cases compared to individuals between 51 to 60 and 61 to 70. Individuals under 10 years old had the lowest number of estimated injuries due to distracted walking.

Table 2. Incident characteristics (N = 29140)

Category		National estimates (%)
Age group	0 - 10	1178 (4.04)
	11 – 20	6510 (22.34)
	21 – 30	5796 (19.89)
	31 - 40	4280 (14.69)
	41 - 50	3319 (11.39)
	51 - 60	2972 (10.20)
	61 - 70	1963 (6.74)
	71 and over	3123 (10.72)
Location of incident	Home	6620 (22.72)
	Public area	4228 (14.51)
	Stairwell	5532 (18.98)
	Street	2996 (10.28)
	Sidewalk	2265 (7.77)
	Others	933 (3.20)
	Unknown	6566 (22.53)
Dispositions	Treated and released, or examined and released without treatment	26581 (91.22)
	Treated and transferred	177 (0.61)
	Treated and admitted	1902 (6.53)
	Held for observation	133 (0.46)
	Left without being seen/Left against medical advice	332 (1.14)
	Fatality, died in ED	15 (0.05)
	Not recorded	0 (0)

Figure 2 shows the percentage of injuries that occurred in each walking environment, broken down by age group. The data provides evidence that the proportion of injuries that occur in each walking environment changed across the age groups. Four major trends stood out in this data. First, the home environment was the site of many injuries due to distracted walking, particularly for the very young (individuals under 10) and older individuals (between 61 and 70, and over 71 years old). Individuals between 21-60 had a smaller percentage of distracted walking injuries that happened in the home environment. Second, the pattern of distracted walking injuries for the public, street, and sidewalk environments was similar. The percentages of distracted walking injuries that happened in these locations were higher between the ages of 21-60, the opposite of the findings for the home location. Third, as expected due to the definition of the "other" walking environment (e.g., school, stadium, industry & mobile), individuals between 11 and 20 were the age group that had the largest percentage of injuries in the other location. Finally, injuries that happened on stairs were highest for children under 10 years old and steadily decreased across the age groups until the age of 50. For individuals between 51 and 60, the proportion of injuries on stairs reversed the previously decreasing trend and was about 1.8 times greater than the percentage of injuries found for individuals between 41-50. After this spike, the injuries due to distracted walking on stairs for the following two age groups (61-70 and over 71 years old) started to decrease once again.

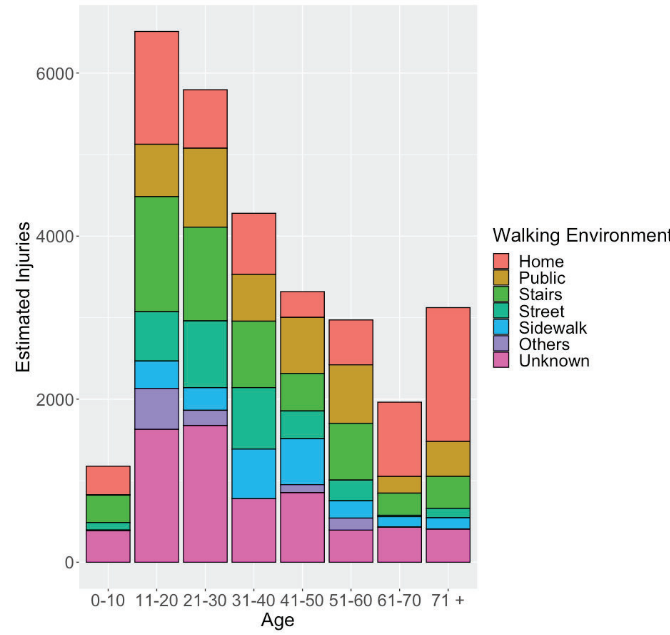

Figure 1. Estimated injuries for each age group from 2011 to 2019 in the US (by walking environments)

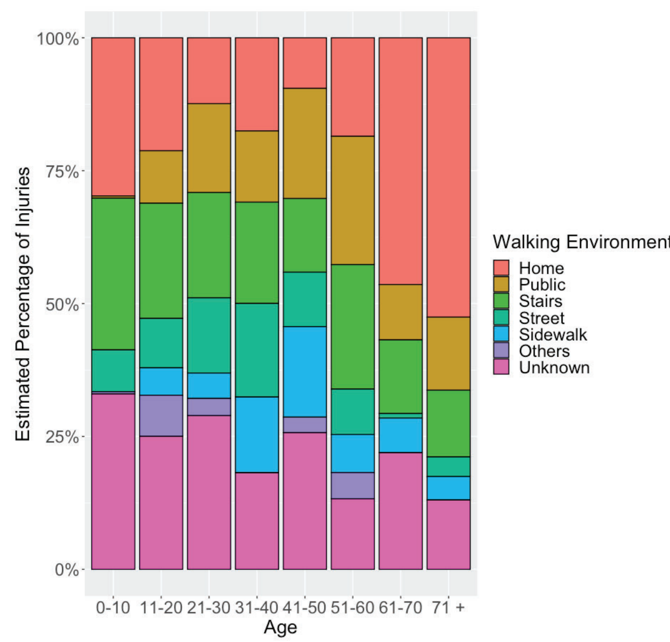

Figure 2. Estimated percentage of phone-related distracted walking injuries aggregated from 2011 to 2019 (by walking environments)

DISCUSSION AND FUTURE WORK

Discussion

The present study used the NEISS dataset to estimate the number of injuries due to phone-related distracted walking across different age groups and walking environments. Overall, the results provided evidence that distracted walking injuries did differ across age groups and walking environments, suggesting that interventions to reduce the distracted walking injuries may need to be tailored for specific populations and locations.

Our results provided an answer to the first research question by showing that the number of estimated distracted walking injuries tended to decrease as age increased. One possible reason for this decrease may have been due to the decreased exposure to phones. Previous studies have shown that younger individuals tend to spend more time with phones, and phone usage tends to decrease with age (Andone et al., 2016; Sarraute et al., 2014). There were two exceptions to this overall decreasing trend, individuals under 10 had very few injuries due to distracted walking, while there was an increase in injuries for individuals older than 70. Decreased access to phones is likely the reason for low injuries in the youngest age group, as individuals in this age range may not have access to their own phones. In contrast, individuals over 70 years old tend to use their phones less than young adults (Andone et al., 2016). Therefore, the increase in estimated injuries was not likely due to longer exposure. Furthermore, the increased injuries for the oldest age group were also not likely due to differences in population size. According to US Census Bureau (2020), the US resident population in the 61-70 and 70+ age groups are roughly equal as of July 2019 (61-70: 38 million; 70+: 36.6 million), thus, it should be some other factors leading to this circumstance. We believe that the increases in injuries for this oldest age group were due to age-related decrements in spatial and temporal gait performance during dual-task conditions, and this explanation has been found to be true in laboratory studies (e.g., Beauchet et al., 2003). The findings in this study suggest that individuals over 70 are particularly vulnerable to phone-related distracted walking.

To investigate the second research question, whether the location where distracted walking injuries occurred changed across the age groups, we examined the proportions of estimated injuries in each walking environment for each age group. Four trends were identified in this data that suggested that the pattern of injuries changed across age groups. As expected, very young and older individuals had more injuries at home while those in the other age groups tended to suffer from distracted walking-related injuries during their activates outside of the home (e.g., in public, street, or sidewalk environments). Furthermore, school-aged individuals (11-20) had a significant percentage of injuries occur in the "other" location that included schools. These results are likely driven by where individuals in different age groups spend their time during the day. Larger exposure to these locations would lead to more distracted walking injuries as well.

However, the same conclusion is not necessarily true for the stair environment. Stairs are an environment that has challenging walking requirements due to their unique walking surface and structure compared to the other walking environments in the present study. Children under 10 years old had the largest percentage of their distracted walking injuries occur on stairs. According to Mickle et al. (2011), younger children (8-9 years old) display a more compromised postural stability compared to older children (11-12 years old), suggesting that this higher percentage of injuries may have been due to lower gait and balance ability. We also found that as age increased, the percentage of estimated injuries that occurred on stairs decreased. However, this trend was reversed for those between 51-60 years old. It is possible that this increase was due to age-related decrements in locomotor control. Studies have found that decrements in muscle strength occur among healthy adults starting at age of 50 years old, which the researchers considered as a cause of negative changes in gait performance (Nigg et al., 1994). Interestingly, in the present study, the increase in estimated injuries on stairs occurred right after the age of 50, in between 51 and 60 years old. For the two oldest age groups, the injury percentage on the stairs decreased again. This decrease may have been due to self-regulation of their walking behaviors to avoid dangerous environments or to reduce phone usage while walking on stairs. Similar self-regulatory behavior has been found in the context of driving for older drivers who reduced their exposure to dangerous driving scenarios (i.e., raining, foggy, etc.) or phone distraction activities (Barrett and Gumber, 2019; Pope et al., 2017). Further investigation is needed to understand whether self-regulation behavior occurs of phone-related distracted walking for older adults on stairs.

Recommendations

This study provided evidence that the home environment was the location of many distracted walking injuries that happened due to phone usage, particularly for those who are very young and very old. While most distracted walking research has focused on pedestrian safety in streets environment, distracted walking campaigns may also want to focus on safety at home where individuals may be less vigilant about their safety.

This study also found that stairs may be a particularly dangerous environment for distracted walking behavior due to phone usage, particularly since stairs may be a location where locomotor control is especially challenging. Researchers have already found that stairs are potentially dangerous areas for distracted walking (Hashish et al., 2017; Ioannidou et al., 2017). These academic findings have raised awareness of public pedestrian safety, but there is still progress to be made for further injury prevention. Moreover, this study found evidence that individuals between 51-60 years old may especially be vulnerable to injuries due to phone-related distracted walking. Individuals in this age group may not have fully realized their decreased locomotor capability while still engaging in distracting activities that may impair their gait and balance. Safety campaign targeting this group of individuals may be required in the future. Moreover, longer exposure to a particular environment (i.e., occupations, daily routine, etc.) can lead to more distracted walking injuries, as was seen in our study for student-aged individuals who were more often injured in the "other" location. Hence, injuries due to distracted walking may also differ between different occupations and should be studied in future work.

Limitations

A few limitations have been identified in the present study. First, the NEISS database only provides injury data based on ED visits. However, distraction-related injuries do not always require a visit to the ED. Therefore, the estimates of distracted walking injury due to phone usage in this study may be underestimated compared to actual values. Second, a large percentage of injuries in this dataset occurred in the "unknown locations" walking environment. Within the NEISS dataset, there were a large number of missing entries for the "locale" variable. Many of these entries could not be further classified based on the two-line narrative. The two-line narratives for unknown locations often focus on patients' activities, injured body parts, or hazard elements in the environment (i.e., tree branch, oily surface, etc.). More information is needed to support location classification for these entries. However, we do not believe that there was a systematic reason for the missing data that would result in estimated injuries from one location being predominately coded as unknown. The NEISS coding manual (2019) does not specify any reasons to exclude the "locale" variable if the information is known, therefore the location of these unknown injuries is likely to be distributed across the different locations and would not impact the results found in this study.

REFERENCES

Anderson, M., Perrin, A., 2017. Technology use among seniors [WWW Document]. Pew Res. Cent. URL https://www.pewresearch.org/internet/2017/05/17/technology-use-among-seniors/

Andone, I., Blaszkiewicz, K., Eibes, M., Trendafilov, B., Markowetz, A., Montag, C., 2016. How age and gender affect smartphone usage. UbiComp 2016 Adjun. - Proc. 2016 ACM Int. Jt. Conf. Pervasive Ubiquitous Comput. 9–12. https://doi.org/10.1145/2968219.2971451

Barkley, J.E., Lepp, A., 2016. Cellular telephone use during free-living walking significantly reduces average walking speed. BMC Res. Notes 9 (1), 1–5. https://doi.org/10.1186/s13104-016-2001-y

Barrett, A.E., Gumber, C., 2019. Feeling Older and Driving Less: The Effect of Age Identity on Older Adults' Transition from Driving. Innov. Aging 3 (1), 1–8. https://doi.org/10.1093/geroni/igz004

Basch, C.H., Ethan, D., Rajan, S., Basch, C.E., 2014. Technology-related distracted walking behaviours in Manhattan's most dangerous intersections. Inj. Prev. 20 (5), 343–346. https://doi.org/10.1136/injuryprev-2013-041063

Beauchet, O., Kressig, R.W., Najafi, B., Aminian, K., Dubost, V., Mourey, F., 2003. Age-related decline of gait control under a dual-task condition. J. Am. Geriatr. Soc. 51 (8), 1187–1188. https://doi.org/10.7771/2380-176x.3639

Caird, J.K., Willness, C.R., Steel, P., Scialfa, C., 2008. A meta-analysis of the effects of cell phones on driver performance. Accid. Anal. Prev. 40 (4), 1282–1293. https://doi.org/10.1016/j.aap.2008.01.009

Centers for Disease Control and Prevention, 2020. Distracted driving [WWW Document]. URL https://www.cdc.gov/transportationsafety/distracted_driving/index.html

Deng, T., Kanthawala, S., Meng, J., Peng, W., Kononova, A., Hao, Q., Zhang, Q., David, P., 2019. Measuring smartphone usage and task switching with log tracking and self-reports. Mob. Media Commun. 7 (1), 3–23. https://doi.org/10.1177/2050157918761491

Forgays, D.K., Hyman, I., Schreiber, J., 2014. Texting everywhere for everything: Gender and age differences in cell phone etiquette and use. Comput. Human Behav. 31 (1), 314–321. https://doi.org/10.1016/j.chb.2013.10.053

Gershon, P., Sita, K.R., Zhu, C., Ehsani, J.P., Klauer, S.G., Dingus, T.A., Simons-Morton, B.G., 2019. Distracted driving, visual inattention, and crash risk among teenage drivers. Am. J. Prev. Med. 56 (4), 494–500. https://doi.org/10.1016/j.amepre.2018.11.024

Governers Highway Safety Association, 2021. Distracted Driving [WWW Document]. URL http://www.ghsa.org/state-laws/issues/Distracted-Driving

Hashish, R., Toney-Bolger, M.E., Sharpe, S.S., Lester, B.D., Mulliken, A., 2017. Texting during stair negotiation and implications for fall risk. Gait Posture 58, 409–414. https://doi.org/10.1016/j.gaitpost.2017.09.004

Hollman, J.H., Kovash, F.M., Kubik, J.J., Linbo, R.A., 2007. Age-related differences in spatio temporal markers of gait stability during dual task walking. Gait Posture 26 (1), 113–119. https://doi.org/10.1016/j.gaitpost.2006.08.005

Hyman, I.E., Boss, M., Wise, B., Mckenzie, K., Caggiano, J., 2010. Did you see the unicycling clown? Inattentional Blindness while walking and talking on a cell phone. Appl. Cogn. Psychol. 24 (2), 597–607. https://doi.org/10.1002/acp.1638

Ioannidou, F., Hermens, F., Hodgson, T.L., 2017. Mind your step: the effects of mobile phone use on gaze behavior in stair climbing. J. Technol. Behav. Sci. 2 (3), 109–120. https://doi.org/10.1007/s41347-017-0022-6

Lamberg, E.M., Muratori, L.M., 2012. Cell phones change the way we walk. Gait Posture 35 (4), 688–690. https://doi.org/10.1016/j.gaitpost.2011.12.005

Mickle, K.J., Munro, B.J., Steele, J.R., 2011. Gender and age affect balance performance in primary school-aged children. J. Sci. Med. Sport 14 (3), 243–248. https://doi.org/10.1016/j.jsams.2010.11.002

Nasar, J.L., Hecht, P., Wener, R., 2008. Mobile telephones, distracted attention, and pedestrian safety. Accid. Anal. Prev. 40 (1), 69–75. https://doi.org/10.1016/j.aap.2007.04.005

Nasar, J.L., Troyer, D., 2013. Pedestrian injuries due to mobile phone use in public places. Accid. Anal. Prev. 57, 91–95. https://doi.org/10.1016/j.aap.2013.03.021

Nigg, B.M., Fisher, V., Ronsky, J.L., 1994. Gait characteristics as a function of age and gender. Gait Posture 2 (4), 213–220.

O'Hern, S., Oxley, J., Logan, D., 2015. Older Adults at Increased Risk as Pedestrians in Victoria, Australia: An Examination of Crash Characteristics and Injury Outcomes. Traffic Inj. Prev. 16, S161–S167. https://doi.org/10.1080/15389588.2015.1061662

Pew Research Center, 2019. Mobile Fact Sheet [WWW Document]. URL https://www.pewresearch.org/internet/fact-sheet/mobile/

Pope, C.N., Bell, T.R., Stavrinos, D., 2017. Mechanisms behind distracted driving behavior: The role of age and executive function in the engagement of distracted driving. Accid. Anal. Prev. 98, 123–129. https://doi.org/10.1016/j.aap.2016.09.030

Russo, B.J., James, E., Aguilar, C.Y., Smaglik, E.J., 2018. Pedestrian behavior at signalized intersection crosswalks: Observational study of factors associated with distracted walking, pedestrian violations, and walking speed. Transp. Res. Rec. 2672 (35), 1–12. https://doi.org/10.1177/0361198118759949

Sarraute, C., Blanc, P., Burroni, J., 2014. A study of age and gender seen through mobile phone usage patterns in Mexico, in: ASONAM 2014 - Proceedings of the 2014 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining. IEEE, Beijing, China, pp. 836–843. https://doi.org/10.1109/ASONAM.2014.6921683

Schwebel, D.C., Stavrinos, D., Byington, K.W., Davis, T., O'Neal, E.E., De Jong, D., 2012. Distraction and pedestrian safety: How talking on the phone, texting, and listening to music impact crossing the street. Accid. Anal. Prev. 45, 266–271. https://doi.org/10.1016/j.aap.2011.07.011

Smith, D.C., Schreiber, K.M., Saltos, A., Lichenstein, S.B., Lichenstein, R., 2013. Ambulatory cell phone injuries in the United States: An emerging national concern. J. Safety Res. 47, 19–23. https://doi.org/10.1016/j.jsr.2013.08.003

Thompson, L.L., Rivara, F.P., Ayyagari, R.C., Ebel, B.E., 2013. Impact of social and technological distraction on pedestrian crossing behaviour: An observational study. Inj. Prev. 19 (4), 232–237. https://doi.org/10.1136/injuryprev-2012-040601

Tian, Y., Huang, Y., He, J., Wei, K., 2018. What affects gait performance during walking while texting? A comparison of motor, visual and cognitive factors. Ergonomics 61 (11), 1507–1518. https://doi.org/10.1080/00140139.2018.1493153

U.S. Consumer Product Safety Commission, 2019. NEISS Coding Manual [WWW Document]. URL https://www.cpsc.gov/s3fs-public/2019_NEISS_Coding_Manual.pdf

US Census Bureau, 2020. Resident population of the United States by sex and age as of July 1, 2019.

US CPSC, 2020. NEISS Highlights, Data and Query Builder [WWW Document]. CPSC.gov. URL https://www.cpsc.gov/cgibin/NEISSQuery/home.aspx

Wang, Y., Bao, S., Du, W., Ye, Z., Sayer, J.R., 2017. Examining drivers' eye glance patterns during distracted driving: Insights from scanning randomness and glance transition matrix. J. Safety Res. 63, 149–155. https://doi.org/10.1016/j.jsr.2017.10.006