Article 1. Fetal Alcohol Spectrum Disorders: The Most Preventable Birth Defect in the World

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Understanding the Most Preventable Birth Defect

Fetal Alcohol Spectrum Disorders (FASDs) are a group of lifelong neurodevelopmental conditions that are entirely preventable, yet remain underrecognized and undertreated worldwide. Despite decades of evidence, prevention continues to lag. Much of the challenge lies not in biology but in human behavior. Drawing on the framework of behavioral economics, two cognitive systems govern decision-making — System 1, which is fast, emotional, and automatic, and System 2, which is slow, rational, and deliberate. Most public-health campaigns still appeal to System 2, assuming people act rationally once informed. However, addictive and impulsive behaviors such as drinking during pregnancy are largely driven by System 1. To prevent FASDs effectively, interventions must reach the heart as well as the mind (Figure 1).

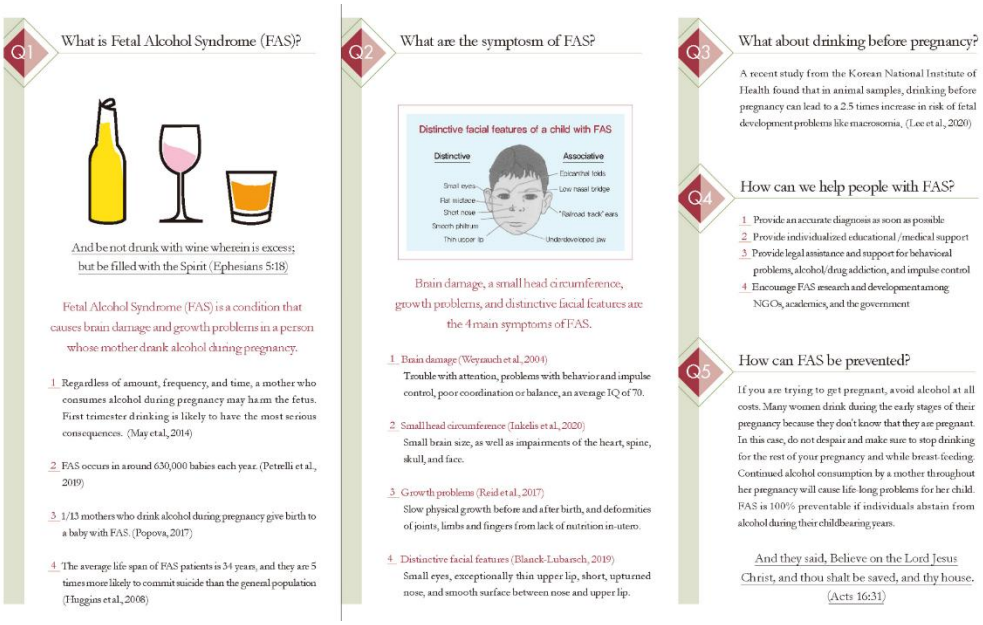


Figure 1 FASD Brochure by the KWCTU

Many individuals who drink, smoke, or engage in other health-risk behaviors already understand the dangers — yet information alone rarely changes behavior. Educational campaigns tend to reach those already health-conscious, unintentionally widening health gaps. Effective prevention therefore requires environmental and policy-level interventions that reshape norms, incentives, and access. For example, the tobacco industry spends in under three days what the CDC allocates for anti-smoking education in an entire year. This imbalance shows that billion-dollar marketing cannot be countered by posters alone. Sustainable progress demands environments that nudge healthier choices while regulating harmful ones.

Designing Environments for Health

In our study published in *Substance Abuse Treatment, Prevention, and Policy* (Oh et al., 2020), we examined the relationship between campus alcohol policies and drinking behaviors among 4,592 Korean college students. Results showed that students who reported their campuses allowed drinking in outdoor spaces had significantly higher alcohol consumption scores ($\beta = 0.755$, $p = 0.010$), and those whose campuses allowed drinking in all areas also showed higher scores ($\beta = 0.820$, $p = 0.044$), compared to students unaware of any policy. Additional analyses revealed that campuses with a larger number of students, a higher proportion of males, more freshmen, students with lower GPAs, and students with higher amounts of pocket money or who smoked had higher alcohol consumption levels relative to their peers.

Interestingly, when examining the effect of alcohol education, the study found no significant association overall, yet among female students, those who received alcohol education more than five times showed a small but notable reduction in consumption compared to those with fewer or no exposures. These findings highlight that information-based education alone is generally insufficient, but when reinforced repeatedly and combined with environmental and regulatory measures—such as campus restrictions—it may support healthier behavior change, particularly among women (Figure 2).

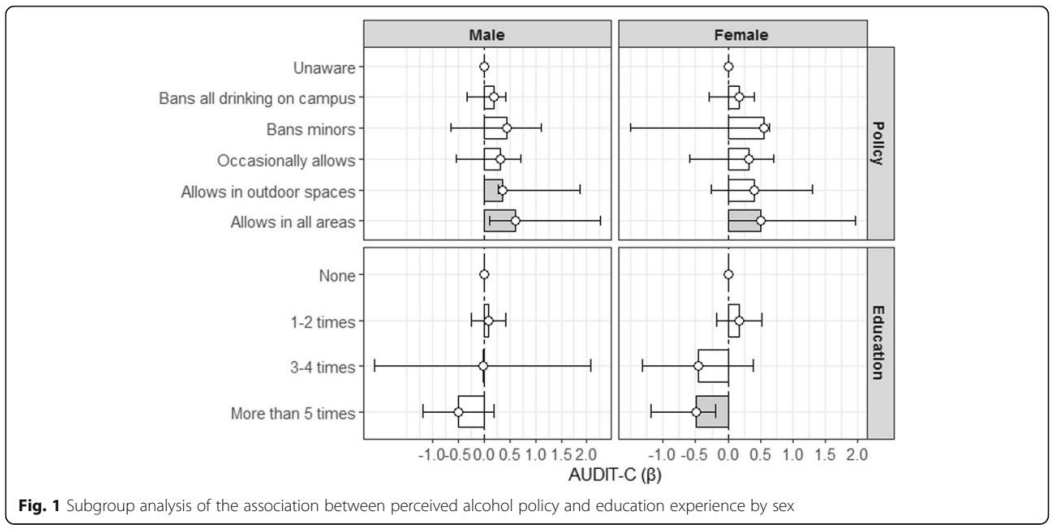


Figure 2 Campus Alcohol Policies And Their Effect

These results illustrate that environments and regulations play a decisive role in shaping behavior. Information (education) is necessary but insufficient; incentives and regulations create measurable behavioral shifts.

Digital Pathways to Prevention

Building on these insights, our team conducted a *systematic review and meta-analysis* published in the *Journal of Medical Internet Research* (Oh et al., 2022), evaluating the effectiveness of digital interventions in preventing alcohol consumption during pregnancy and the pre-conception period. Analyzing six eligible studies, we found that digital interventions reduced the odds of alcohol use during pregnancy by **38%** (pooled OR = 0.62; 95% CI: 0.42–0.91; $p = 0.02$). In particular, **computer- and internet-based programs were**

significantly effective (OR = 0.59; 95% CI: 0.39–0.89), while **text-messaging programs showed mixed results** due to limited evidence (Figure 3).

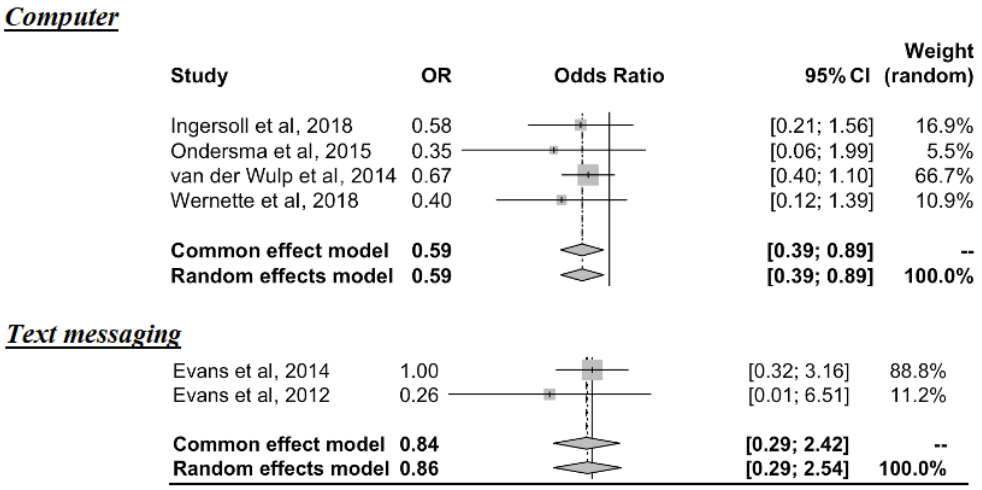


Figure 3 Digital Interventions by Platform Type and Their Effect

These findings underscore that digital tools can serve as scalable, low-cost complements to traditional education, reaching expectant mothers early with personalized, stigma-free interventions. When paired with environmental strategies and regulatory supports, they can bridge the gap between knowledge and action, promoting sustained behavioral change.

The Consequences of Inaction

Our research team also examined the clinical burden of FASDs in a nationwide cohort study published in *Scientific Reports* (Oh et al., 2020), analyzing data from more than 3,100 individuals diagnosed with FASDs in South Korea between 2003 and 2013. The results revealed a striking pattern of vulnerability: **27.5%** of individuals with FASDs experienced hospitalizations, and **12.5%** died during the study period. Compared to their general population peers, FASD patients had a **1.25-fold higher risk of hospitalization** (HR = 1.25, 95% CI: 1.05–1.49) and a **1.33-fold higher risk of all-cause mortality** (HR = 1.33, 95% CI: 1.07–1.67). The most common cause of hospitalization was diseases of the nervous system, for which individuals with FASDs were **52 times more likely** to be hospitalized (HR = 51.78, 95% CI: 29.09–92.17). These findings demonstrate that FASDs are not only preventable but carry serious long-term health consequences, reinforcing the urgent need for early prevention, lifelong care, and integrated public-health strategies that combine behavioral insight with systemic intervention.

Conclusion

Together, these three studies tell a unified story: **Policy shapes norms, technology amplifies access, and science reveals the cost of inaction.** Preventing FASDs requires a whole-of-society approach—one that begins with shaping environments, harnesses digital innovation to engage expectant mothers, and sustains care throughout life. When policy, technology, and empathy align, prevention becomes not only achievable, but inevitable.

References

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