Skeletal Central: Gamifying Bone Health Education

A Surprising Problem

Contrary to popular belief, Australian teenagers fracture bones more often than older adults. In 2021-22, fractures accounted for 36% of all injury hospitalisations among children and teenagers, with peak rates between ages 13 and 15, when approximately 770 per 100,000 young people required hospital treatment. These injuries cost Australia around $212 million annually.

Two factors drive these high fracture rates. First, teenagers are naturally more active and risk-taking, participating in competitive sports and activities. Over half of all sports injuries requiring hospitalisation are fractures. Second, during puberty, rapid bone growth temporarily increases porosity, weakening bones and making them more vulnerable during this critical developmental window.

Despite these concerning statistics, preventative education on bone and joint health remained largely absent from school curricula, creating a significant gap in adolescent health education.

Identifying the Educational Barriers

Dr Julie Boston and the Bone Health Project collaborators conducted a national survey of 99 educators to understand why bone health education was underrepresented in schools. The research identified three critical challenges: teachers lacked training and confidence to teach bone and joint health concepts effectively; educators strongly desired targeted professional development and updated pedagogical strategies; and there was a scarcity of high-quality, engaging, age-appropriate digital learning materials.

An Innovative Solution

In response, Dr. Boston and collaborators co-designed curriculum-aligned, evidence-based digital educational resources for Years 7-10 students. The centrepiece was “Skeletal Central," a serious educational game designed to increase bone health awareness, knowledge, and motivation. The solution also provided professional learning tools to build educator confidence and skills, making musculoskeletal health a meaningful component of health education during adolescence.

Demonstrated Impact

The evaluation involved pre- and post-gameplay surveys of 89 high school students after a 20-minute play session. Results showed significant improvements in bone health literacy, more positive attitudes towards weight-bearing exercise, and greater awareness of vaping and smoking risks. Students reported increased confidence in adopting healthy bone behaviours. Notably, over 70% found the game engaging and enjoyable, and more than half said they would play it frequently.

Reach and Integration

The project engaged over 400 diverse participants through inclusive co-design, including students, parents, educators, sports coaches, nurses, and allied health professionals. Launched in October 2024, the Skeletal Central educator hub provides open-access resources, with YouTube animations attracting approximately 11,800 views.

Significantly, the resources have been integrated into Scootle, Australia's national digital repository of free, curriculum-aligned materials, making them readily accessible to teachers nationwide. This integration directly supports the Federal Health Department's Strategic Action Plan for Osteoporosis (2019), which advocates improved awareness and school-based education as prevention strategies.

Long-term Outcomes

The initiative has enhanced students' and teachers' awareness of bone health, increased engagement in preventive health education, and improved curriculum delivery. By equipping educators with accessible, high-quality tools, the project fosters early prevention. It encourages adolescents to build peak bone mass during this vital period, ultimately reducing future fracture and osteoporosis risk and establishing a scalable model for addressing other underrepresented areas of adolescent health literacy.