<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>Pesky gNATs: Using Games to Support Mental Health Interventions for Adolescents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Authors(s)</strong></td>
<td>Coyle, David; van der Meulen, Hidde; Tunney, Connal; Cooney, Patricia; Jackman, Catherine</td>
</tr>
<tr>
<td><strong>Publication date</strong></td>
<td>2017-10-18</td>
</tr>
<tr>
<td><strong>Conference details</strong></td>
<td>The ACM SIGCHI Annual Symposium on Computer-Human Interaction in Play (CHI Play 2017), Amsterdam, The Netherlands, 15-18 October 2017</td>
</tr>
<tr>
<td><strong>Publisher</strong></td>
<td>ACM</td>
</tr>
<tr>
<td><strong>Link to online version</strong></td>
<td><a href="https://chiplay.acm.org/2017/">https://chiplay.acm.org/2017/</a></td>
</tr>
<tr>
<td><strong>Item record/more information</strong></td>
<td><a href="http://hdl.handle.net/10197/9310">http://hdl.handle.net/10197/9310</a></td>
</tr>
</tbody>
</table>
 Pesky gNATs: Using Games to Support Mental Health Interventions for Adolescents

David Coyle  
School of Computer Science,  
University College Dublin,  
Dublin, Ireland.  
d.coyle@ucd.ie

Conall Tunney  
School of Psychology,  
University College Dublin,  
Dublin, Ireland.  
conall.tunney@ucdconnect.ie

Gary O’Reilly  
School of Psychology,  
University College Dublin,  
Dublin, Ireland.  
gary.e.oreilly@ucd.ie

Hidde van der Meulen  
School of Computer Science,  
University College Dublin,  
Dublin, Ireland.  
hide.vandermeulen@ucd.ie

Patricia Cooney  
School of Psychology,  
University College Dublin,  
Dublin, Ireland.  
patricia.cooney@ucdconnect.ie

Catherine Jackman  
Cheeverstown House,  
Dublin, Ireland.

Abstract  
This position paper gives a brief overview of a long-term and ongoing series of projects focused on the design and evaluation of computer games that can support mental health interventions with young adolescents. The work has its origins in a HCI project, but has evolved into a long-term interdisciplinary collaboration involving game designers, computer scientists and clinical psychologists, amongst others. It has resulted in a series of computer games and mobile apps that support a range of interventions including Cognitive Behavioural Therapy (CBT) for depression and anxiety, mindfulness-based CBT, an extended intervention CBT for adolescents experiencing trauma, and a CBT intervention for adults with intellectual disabilities. The games and mobile apps have been widely distributed and have been evaluated through randomised controlled trials in clinical settings. Here we briefly describe each game; the overall design process, motivation, and theoretical background; the results of key evaluations; some of our core lessons.

Author Keywords  
Computer games; mobile apps; mental health; Cognitive Behavioural Therapy; adolescents.

First steps – Personal Investigator  
The series of games outlined below have their origin in work published at ACM CHI 2009 [1]. At the outset,
Author Bios

David Coyle is an Assistant Professor with the School of Computer Science at University College Dublin. His research focuses on the design of technology to support health interventions, with a particular focus on mental health. This has included computer games and mobile apps for young people and online interventions for adults. His research has resulted in large-scale deployments and two spinout companies. He currently leads the EU funded TEAM ITN (www.team-its.eu).

Hidde van der Meulen: is a Marie Skłodowska-Curie Early Stage Researcher and PhD candidate with the School of Computer Science at University College Dublin. His research focuses on the development of an adaptable gaming platform to support mental health interventions for adolescents. Hidde’s work is funded through the TEAM ITN by the EU European Union’s Horizon 2020 research and innovation programme.

This project aimed to develop a new technology that would help to support face-to-face clinical interventions involving adolescents and a therapist in the Department of Child and Family Psychiatry in a large local hospital. The paper documents the theoretical background, collaborative design process, and key decisions that led to the development of a computer game called Personal Investigator (PI). Key decisions included the choice of a game type (role-play), the intervention model applied (Solution Focused Therapy), and the means by which therapeutic content was integrated with game play. It also discusses more detailed design decisions, such as the incorporation of video-based peer stories and the use of a in-game notebook to provide a reflective space during game play. [1] also details the initial clinical evaluation of PI. Eight therapists used the game with a total of 22 adolescents, ranging in age from 10 to 16 and experiencing a broad range of difficulties including depression, anger management difficulties, low self-esteem, behavioural problems, bullying, sexual abuse, attention difficulties (including ADHD), and suicidal ideation. Overall the game was seen to have a positive effect1. The evaluation also identified key lessons including the importance of the game control mechanisms, the need for flexibility in game design, and crucially, the way in which appropriately designed games can change the dynamics of the therapeutic interaction in a way that favours young people.

gNATs Island

While the PI project applied Solution Focused Therapy, our larger body of subsequent work has focused on computer games and mobile apps that support Cognitive Behavioural Therapy (CBT). Our initial implementation of a game designed to support CBT is described in a paper published at ACM CHI 2011 [2]. This game, called gNATs Island, was the first step in a long-term and ongoing collaboration between David Coyle (a computer scientist and HCI researcher) and Gary O’Reilly (an academic and practicing clinical psychologist). gNATs Island applied and extended many of the design principles from PI. The therapeutic content was adapted from an existing paper-based CBT workbook previously developed by O’Reilly, which was already in widespread use.

[2] describes the preliminary evaluation of gNATs Island detailing two clinical studies and series of workshops in which 216 practicing mental health professionals received training in the gNATs Island CBT intervention for young adolescents. As was the case with PI, gNATs Island had a positive impact. It was very highly rated by therapists, the vast majority of whom rated it as either potentially ‘very’ or ‘extremely useful’ in their clinical work.

Pesky gNATs

With the support of funding from a National Health Services (NHS) enterprise body and Small Business Research Initiative (SBRI) in the UK, the original gNATs Island game has recently been extensively re-designed and extended. The funding has allowed us to develop a series of four desktop games, all of which apply the same core design principles. These games are used to support a range of face-to-face mental health interventions. Three of the games are also supplemented by mobile apps which patients can use between meetings with their therapists. Here we provide a brief overview of each game, with reference to further literature.

1 It is important to recognise that the evaluation presented in [1] was preliminary in its nature. It provided initial evidence for the potential of computer games in mental health interventions, but should not be view as strong evidence.
**Pesky gNATs: A CBT Computer Game to Assist Young People with Anxiety or Low Mood**

The Pesky gNATs computer game is designed to support the delivery of a CBT intervention for young people experiencing anxiety or low mood. It is used in face-to-face clinical sessions where a young person plays the game alongside a mental health professional. In the game, young people visit a 3-D world called “gNATs Island” and meet a team of wild-life explorers. The game has seven levels. Each level is designed to be the equivalent of a standard treatment session and supports a single component of a customised, developmentally appropriate CBT intervention. Key concepts are illustrated through conversation, embedded animations, videos and questions, using examples from a young person called Shona who has also experienced difficulties with anxiety and low mood and has played the game before.

The computer game is supplemented by a mobile app designed to help young people apply the CBT ideas they learn in session with their therapist, to their everyday life at home, at school and in their community. The app includes weekly CBT tasks, mindfulness and relaxation skills, and three gNAT related mini-games that are unlocked when the young person completes between session exercises. Figures 1 and 2 include screenshots of the Pesky gNATs game and mobile app respectively. Further details are available at [www.peskygnats.com](http://www.peskygnats.com).

**Mindful gNATs**

Whereas the core Pesky gNATs game is designed for use in clinical settings, Mindful gNATs has been developed as a ‘step down’ game that can be used in a broader range of settings, including school and community settings. It again incorporates a game and mobile app and focuses on teaching young people mindfulness techniques. A detailed qualitative study of young people’s experiences of Mindful gNATs has been recently published in [3]. The Mindful gNATs app is freely available through iTunes and Google Play.

**Pesky gNATs: Trauma Recovery**

Whereas the core Pesky gNATs game supports a generalised CBT intervention, our Trauma Recovery game supports a targeted and extended CBT intervention for young people who are experiencing trauma. It is designed for use with mental health professionals only and supports a 16 week clinical intervention. This computer game and mobile app are currently in the final stages of development.

**The Feel Good Island**

Many of the challenges involved in adapting CBT for young people also apply to adapting this intervention approach with adults with intellectual disability. In The Feel Good Island the therapeutic content from the original gNATs Island game was adapted to address this challenge. A recent RCT of this new game suggests that it is more effective in treating anxiety in this population than treatment as usual [4].

**Key Lessons**

A more detailed description of the many lessons we have learned through the design and evaluation of our games is beyond the scope of this extended abstract. But we would like to highlight three key lessons.

**Changed dynamics:** our games are designed to support face-to-face psychological interventions for mental health. Across all of our game we have found that a key to their success is the way in which games change the
dynamics of the interaction between young people and therapists. Games can take the emphasis of face-to-face conversation, which many young people find difficult, and provide an active process and a third party in the room.

*Engagement with the therapeutic process:* games can be hugely engaging for adolescents, but it is important not to lose sight of the key requirement in this space. Games are only useful in so far as they improve engagement and the effectiveness of the therapeutic process. The overall emphasis must always be on engagement with the therapeutic process.

*The role of the therapist:* while our games are designer to support the therapist, they are in no way designed to replace a therapist. The relationship between therapists and patients remains key and should be supported.

**Acknowledgements**

This work has been partially funded by the SBRI Healthcare and through the TEAM ITN which has received funding from the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 722561.

**References**