Designing a health screening tool to help young people communicate with their general practitioner

Marianne Webb, Lena Sanci, Sylvia Kauer, Greg Wadley
The University of Melbourne
Parkville 3010 Australia
webbm@unimelb.edu.au

ABSTRACT
Adolescence is an important developmental period for physical, cognitive, social and emotional development when a wide range of health problems and risky health-related behaviours may emerge and co-occur. General Practitioners (GPs) are ideally positioned to deliver preventive health and early intervention as part of young people’s routine health care. A quick and effective way for GPs to identify areas of concern is through technology-based health screening tools, which are acceptable to young people and facilitate self-disclosure about sensitive topics. Despite these advantages, the rate of using this technology remains low. This is the first study that involves all end users and stakeholders in the design of a health screening technology for young people in general practice settings. Our rich findings on the design needs and concerns of young people, GPs, practice staff and parents regarding technologies for health communication will be useful to any researchers and practitioners designing health technologies in a general practice setting.

Author Keywords
Screening, adolescent, participatory design, user-centred design, general practice, health

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
Adolescence and young adulthood is an important period for physical, cognitive, social and emotional development. During this time, a wide range of mental health issues and health compromising behaviours may emerge and co-occur, and persist into adulthood (Sawyer et al. 2012). For example, the highest incidence of mental health problems occur during adolescence, with one in four young people experiencing a mental health disorder, and 75% of people with mental health disorders experiencing onset by 25 years of age (Kessler et al. 2005). Such disorders typically persist throughout the life course (Andrad et al. 2000).

Young people may also develop lifestyle habits during adolescence that contribute to the burden of disease into adulthood (Sawyer et al. 2012). Practices such as physical inactivity and unsafe sexual activity are likely to co-occur in young people (Brener and Collins 1998; Burnett-Zeigler et al. 2012) and have the potential to adversely affect physical and mental health (Spring, Moller, and Coons 2012).

Despite this high prevalence, most young people do not seek help regarding mental health issues and health compromising behaviours (Rickwood, Deane, and Wilson 2007). However, 70-90% of young people visit a general practice or primary care doctor at least once per year, most commonly for physiological reasons (Tylee et al. 2007). This suggests that General Practitioners (GPs) are in a unique position to deliver preventive health and health promotion as part of young people’s routine health care, providing early detection and intervention for emerging health concerns. Indeed recent research has found that an intervention where GPs identified and counselled young people with risky behaviours led to a reduction in illicit drug use and fewer unplanned pregnancies (Sanci et al. 2015).

Although general practice has the potential to deliver prevention and promotion, very few young people report that they discuss preventive health issues with their GP. For example, when young people aged 15 to 24 were asked about issues discussed with their GP in the last 12 months, only 3% reported having talked about physical activity, 6% about safe sexual practices and 1% about drinking alcohol (Australian Bureau of Statistics 2013).

There are a number of reasons why young people and GPs may not be discussing these important health issues. GPs report a lack of time to screen multiple health areas (Yarnall et al. 2003) and feel uncomfortable raising sensitive issues that are not the presenting issue (Henry-Reid et al. 2010). Barriers for young people raising issues are embarrassment (Tylee et al. 2007), concern about privacy and confidentiality (Fairbrother et al. 2005) and lack of recognition of having a problem (Haller et al. 2009).

A practical solution to this predicament is the use of health screening tools. These are typically a set of questions completed by a patient that facilitate the quick identification of areas of concern. A major advantage of screening is that it increases the recognition of health problems that may otherwise go undetected (Paul et al. 2014).
Technology-based health screening tools are designed to be completed by prior to consultation, and are administered via computer or tablet, with results sent immediately to the GP (such as via wireless Internet) in the form of a summary report. These tools enable GPs to normalise sensitive issues, guide discussion about risky behaviour and promote healthy lifestyles (Fothergill et al. 2013).

Figure 1: A technology-based health screening tool, administered by tablet, in a general practice waiting room

An advantage of technology-based screening is that it increases the recognition of health problems because young people are more likely to self-disclose via technology compared with pen and paper (Pappas et al. 2011).

Despite the potential advantages of incorporating technology-based health screening into the regular care of patients, the rate of such screening in general practice remains low in Australia (16%) (McInnes et al., 2006). There is a growing body of research investigating technology adoption in the general practice setting that may explain why adoption is low. It is known that adoption is influenced by a range of inter-related technical, social and organisational factors (Cresswell and Sheikh 2013). Involving all end users in the design stage of technology development may be an effective way for these inter-related factors to be identified and integrated into health technology design and development (Bélanger et al. 2012).

Human Computer Interaction (HCI) provides a framework to involve end users and stakeholders of technology in the design process. Indeed, there is increasing recognition from health researchers about the potential that HCI has to identify, and explore, the acceptance and adoption requirements of health technologies (Poole 2013). For example, user-centred design explores the needs of relevant end users and stakeholders of a technology within the context of use. Additionally, participatory design gives end users and stakeholders greater control and engages them more closely in the design of technology to ensure that it meets their needs and is contextually relevant (Clemensen et al. 2007). In participatory design, knowledge is generated through experiential, generative activities with an emphasis on co-operative learning and design by doing (Hagen et al. 2012). Participatory design has the advantage of providing inclusive and meaningful participation for participants in the research process in a way that other traditional methods of research do not.

Research exploring the design needs of technology-based health screening tools for young people in general practice is very limited. The needs for young people are very unique, so design requirements cannot merely be transposed from other populations on to young people (Fitton and Bell 2014). One study by Whitehouse et al. (2013) described the involvement of young people and health care professionals in the design of a tool, though this was for use in hospital rather than the general practice context (Whitehouse et al. 2013).

There is also a paucity of research that explores the needs of GPs and practice staff regarding screening reports. For instance, it is unclear how tools should be designed to be successfully integrated into existing medical and office technology ecosystems of diverse general practice settings. One study that investigated the implementation of a screening tool for adults visiting GPs found that the attitude of administration and reception staff can be the most significant barrier to adoption (Clark et al. 2009). Thus, it is important to include administrative staff in the design of technologies intended for use in general practice settings.

Another gap concerns the role of parents in the design and use of screening tools by young people. While parents are not primary users, they may still be active participants in their child’s healthcare and have the potential to influence whether the tool is used and should be consulted in its design. For instance, parents of young people aged under 18 are typically responsible for making appointments, going to the clinic with their child and speaking on behalf of their child with GPs and reception staff. For these young people, it is parents who may act as gatekeepers for the adoption of a screening tool; thus it is important to consider their needs in the design of the tool.

This is the first study that involves all these relevant users and stakeholders in the design of a health screening technology for young people in general practice settings. Previous research for this audience and setting have not involved all end users in this critical stage of technology development. In the research reported here, the authors used participatory and user-centred techniques with young people, GPs, practice staff and parents to investigate the design requirements for a health screening tool. Our expectation is that these techniques will help ensure acceptability and adoption of screening tools in this setting.

METHOD

A series of workshops was held with representatives of relevant users and stakeholders: young people, GPs and parents of young people. In addition to these workshops, one-on-one face-to-face semi-structured interviews were conducted with general practice staff (receptionists and practice managers). The intention was that design be iterative in nature, in that each workshop incorporated and extended findings from earlier workshops and interviews.

Participants

Participants were recruited via a range of sources. The participant numbers, age and gender for the workshops
and interviews are summarized in Table 1. In addition, GPs reported having worked in general practice for an average of 16 years, ranging from 4 years to 30 years.

Young people were recruited through an advertisement on Facebook, targeting those aged 14 to 25 living in Melbourne. GPs and practice staff were recruited through an advertisement in the newsletter of the Victorian Primary Care Practice-Based Research Network, managed by the Department of General Practice at the University of Melbourne. Parents were recruited through an advertisement in the weekly staff newsletter of the University of Melbourne.

We did not recruit the parents of the young people in our study as this could compromise young people’s sense of confidentiality and willingness to be open about their experience of going to the GP.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Gender: n</th>
<th>Age: n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young people 14-17 years</td>
<td>Female: 5 Male: 3</td>
<td>14 years: 1 15 years: 3 16 years: 1 17 years: 3</td>
</tr>
<tr>
<td>Young people 18-25 years</td>
<td>Female: 6 Male: 2</td>
<td>18 years: 4 19 years: 1 20 years: 1 23 years: 1 25 years: 1</td>
</tr>
<tr>
<td>GPs</td>
<td>Female: 4 Male: 4</td>
<td>25-34 years: 1 35-44 years: 3 45-54 years: 2 55-64 years: 2</td>
</tr>
<tr>
<td>Practice staff interviews</td>
<td>Female: 11</td>
<td>18-24 years: 2 25-34 years: 4 35-44 years: 1 45-54 years: 4</td>
</tr>
<tr>
<td>Parents of young people</td>
<td>Female: 8 Children’s ages*: Female: 7 Male: 9</td>
<td>35-44 years: 1 45-54 years: 5 55-66 years: 2 Children’s ages*: 15-17 years: 7 18-25 years: 9</td>
</tr>
</tbody>
</table>

*did not attend workshop

Table 1: Number, gender and age of participants, and their children, of workshops and interviews held

Activities

We first held two workshops with young people, one with those aged 14 to 17 and another with those aged 18 to 25. We held separate workshops in case young people at different stages of transitioning into adulthood identified different design needs or concerns. The purpose was to identify their design needs for a technology-based health screening tool. In particular, we were interested in knowing where and when they would like to use the tool, on what device, as well as functional and content requirements. These workshops were approximately four hours in length.

The first activity in the youth workshops was developing personas to understand the range of motivations and needs of young people in using a tool. Key sections of the persona templates had been partially filled out prior to the workshop. These included age and location, reason for seeing a GP, underlying health concern (different to the presenting condition), and a rating of their self-awareness. This information was based on published adolescent health data (Sawyer et al. 2012). Young people then completed critical design information such as screening location and device. Providing a partially-filled, rather than blank, persona template is unorthodox. However, it enabled sensitive health issues, such as sexually transmitted infections, to be identified in a non-confronting way, while still ensuring there was opportunity to feedback and own the process.

Using the personas they had developed, participants then created storyboards describing how they would like to use the tool in the real-world setting, providing insights into adoption barriers and facilitators. Next, young people created paper-based prototypes to identify design, content and functionality requirements.

A final activity completed by only the 14 to 17 year old group was creating and acting out a role-play in which they imagined recommending the tool to a friend. This helped to identify the potential benefits of using the tool.

During the first workshop the 14 to 17 year old participants stressed that the language in which the tool questions was expressed would be important determiner of acceptability. Thus the 18 to 25 year old group spent time reviewing and rewriting questions for the tool, which were taken from the HEEADDSS method of interviewing adolescents, a screening tool recommended by the Royal Australian College of General Practitioners. The tool focuses on Home environment, Education and employment, Eating, peer-related Activities, Drugs, Sexuality, Suicide/depression, and Safety from injury and violence (Klein, Goldenring, and Adelman 2014).

We next conducted a workshop with GPs of approximately three hours in length. The aims of this workshop were to identify the requirements for the summary report of the tool and how GPs required it to be integrated into their existing technology use. The workshop activities were paper-based prototyping and systems mapping. Systems mapping is an activity in which participants create a visual map of the different actors, mutual links and flow of information that would interact with the screening tool.

Following the workshop with GPs we conducted a series of semi-structured interviews with receptionists and practice managers, to explore the current technology use of practice staff and their needs in terms of how a technology-based screening tool could be designed to ensure adoption within their workflow. Each interview went for approximately 40 to 60 minutes.
The final workshop was held with parents of young people aged 14 to 25, and was approximately two hours in length. We did not mirror the youth workshops by holding separate workshops for parents of those with children aged 14 to 17 and another for those aged 18 to 25; we felt it likely that some participants would have children in both age groups and might offer useful perspectives.

The purpose of this workshop was to explore how parents would feel about their child using a health screening tool and identify any design features that would facilitate their acceptance of it. The two activities were a brainstorming session, identifying concerns and needs, and a role-play activity, where parents acted out a phone interaction between a parent and receptionist that would facilitate tool acceptance.

Materials collected at the workshops were: audio recordings, paper materials (of group discussion notes, prototypes, storyboards), and photos of whiteboard notes. The first author transcribed the audio recordings and conducted a thematic analysis on all materials to identify patterns or themes within the data (Braun and Clarke 2006). An inductive approach was taken, where themes emerge directly from the data, rather than from a pre-existing coding framework (Patton 2002). Themes were discussed and agreed upon by co-authors who had also attended the workshops. Findings are presented in the following section.

**RESULTS**

Key findings from workshops and interviews are summarised in Table 2 and described in detail below.

**Participatory design workshops with young people**

Overall, young people were enthusiastic about the screening tool and believed it would improve their experience of seeing their GP. They identified a number of key benefits to using a tool. One was that it would decrease the awkwardness of raising sensitive issues: “Some problems might be embarrassing [to raise] face-to-face”. It would also assist young people to be more independent and take a more active role in their interaction with their GP: “if my mum’s there I’ll make her speak for me”. Another benefit of the tool would be enabling the communication of all relevant information: “the difficulty in actually explaining the problem [verbally to the GP] because you have been waiting for so long and now you only have 5 or 10 minutes to explain [the health issue]...so that is a problem, you’re not able to actually express everything”. Other benefits identified were that the tool would increase confidence in discussing sensitive issues with their GP and enable them to plan what they would say before the consultation. Finally, the tool could help identify the most salient health issues: “it could tell you what’s actually important to tell your doctor”.

**Privacy and confidentiality**

Ensuring the tool had adequate security and privacy functionality was essential to all young people, though it was particularly important to the 14 to 17 year old group: “something the users can know is how the data is going to be transmitted, is it going to be encrypted”. Swapping their phone with friends was common and young people wanted to ensure that any sensitive information was not easily accessible. An acceptable solution proposed by young people was using a dedicated PIN to access the tool, similar to those used by most banking apps.

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Primary design needs of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young people 14-17 years</td>
<td>• On own device, in own time</td>
</tr>
<tr>
<td></td>
<td>• Secure and private</td>
</tr>
<tr>
<td></td>
<td>• Credible logo</td>
</tr>
<tr>
<td></td>
<td>• Non-judgemental</td>
</tr>
<tr>
<td>Young people 18-25 years</td>
<td>• Conversational and engaging language</td>
</tr>
<tr>
<td></td>
<td>• Simple design, not too much text</td>
</tr>
<tr>
<td></td>
<td>• Ability to skip and flag items</td>
</tr>
<tr>
<td>GPs</td>
<td>• Report to flag high risk issues at top, and recommend next steps and referrals</td>
</tr>
<tr>
<td></td>
<td>• Minimise medico-legal risk</td>
</tr>
<tr>
<td>Practice staff interviews</td>
<td>• Adaptable to their existing work practices and technology use</td>
</tr>
<tr>
<td></td>
<td>• Minimise additional work</td>
</tr>
<tr>
<td>Parents of young people</td>
<td>• Range of comfort level of child discussing issues alone with GP</td>
</tr>
<tr>
<td></td>
<td>• Must trust in the GP to follow up</td>
</tr>
<tr>
<td></td>
<td>• Want to view the questions</td>
</tr>
</tbody>
</table>

Table 2: Primary design needs of participants of workshops and interviews held

It was also important for young people to feel reassured about confidentiality in order to feel comfortable to be honest in responding: “just so people can be like ‘oh ok’ and not be worried that they’re going to call the cops if I say I do hard-arse drugs every day”.

**Layout**

As shown in the prototype drawn by young people in Figure 2, young people liked the use of icons, and minimal text, to aid navigation: “you don’t want to be reading through heaps of text.” They also recommended that the tool start with questions on less sensitive health issues: “You’ve got to work your way to this area [more sensitive questions], [so starting with] something like diet sleep, family medical history, mental/emotional state, drugs, sexual activity, so it’s like you’ve been warmed up a bit.”

**Content**

Young people wanted questions and responses to reflect the complexity of their lives and the different contexts they experienced. An example raised was that a young person might be feeling depressed, not due to ongoing
clinical illness, but rather as a normal and temporary reaction to other events in their life, such as a death in the family. A major concern for young people was the possibility of being judged by the GPs based on their responses; “don’t want to be labelled”. Rather than yes/no responses that are “just too definite”, young people wanted the option of rating concerns on a scale. Being able to both skip or elaborate on items was important to young people.

Look and feel
Young people felt it was important for the tool to be designed in such a way that suggested credibility and legitimacy. As shown in Figure 3, they suggested that adding a government or university logo on the splash screen would be a “logo of integrity”. Young people preferred a “clean, simplistic, minimal aesthetic…not cluttered with information”.

Conversely, young people also did not want the tool to be “too clinical”, and wanted it to have a conversational and engaging tone. Ways to do this included personalised greetings, the use of “more colourful…or soft colours or greys instead of black and white, really harsh colours”, introductory text that outlined the benefits and might motivate them to use it. Said one participant: “it should be really fun to use and have some greetings, like says hello to you and goodbye to you and ‘have a nice day’”.

No automated advice
Young people were adamant that they did not want any automated advice on the tool. We proposed a feature to provide tailored tips, information or links to existing evidence-based online self-help interventions based on young people’s responses that could be viewed and used prior to the consultation. However young people felt that advice would have more credibility if it was received directly from the GP: “the thing with getting tips and all that is that sometimes if you hear it from someone you take it in more because it seems like the person is more interested in you but if you read it on the app you just skim over it…it would be more beneficial [from GPs]”. If any additional advice was included, young people felt it was important that they were optional features: at the “bottom of [the] page – there if you need it.”

While young people stressed the tool’s content and design “just needs to be simple” they also suggested a range of other features for future versions of the tool. These included the ability to share their results with other health professionals (such as psychologists), being able to complete the screen again and track results over time, a GPS functionality that showed bulk billing GPs in their area, reminders for things such as pap smears, and the ability to receive prescriptions, information about medications, medical certificates and referrals from the GP.

Platform and location
Young people expressed a preference to complete the screening tool on their own computer or mobile device. Completing the tool on the their smartphone was the most popular option. Young people felt it was important that the tool be usable on both Android and Apple platforms, as both are widely used by their peer group. Their preference was to be sent a link to download the tool at the time of making the appointment with their GP and to complete the tool in their own time before attending the practice. However they also wanted the option of completing the tool in the waiting room immediately before the consultation: “it’s convenient to have more options than one, so to have it on your own phone it would be simple to do it in your own time”.

Participatory design workshop with GPs
GPs spent some time discussing the advantages and disadvantages of conducting screening via technology versus face-to-face. In particular, GPs expressed concern that “there’s no body language in an app, the space is really not your personal space and all of those things
le bit more. A tool that all clinics used medical technology use by practice staff in their roles and effective integration or make an interviewed with practice staff already feel are burdensome. Added into other electronically received results that they have clinical software. Could be saved as an attachment in the possible, Zedmed currently used in Australian general practices (e.g. GPs preferred to have summary results automatically be saved in the summary report. This was brief and highlighted areas of high risk at the top of their screen, so it could be quickly scanned. They also preferred that a summary include a brief outline of suggested next steps and referrals based on areas of concern.

GPs were mindful of the needs of young people and how to best use the results. They felt that although classifying issues as ‘high risk’ to ‘low risk’ in their report would be helpful for GPs, using these terms with young people could be inappropriate and perceived as judgmental. GPs also liked the idea of young people using the tool regularly and being able to track the results over time in the summary report.

Software compatibility
GPs preferred to have summary results automatically integrated within their existing medical software and client files. However, they recognised that this may not be possible, given the number of different software programs currently used in Australian general practices (e.g. Zedmed and Medical Director). If integration was not possible, GPs wanted reports from the screening tool to be saved as an attachment in the patient files of the clinical software. While not ideal, they felt this would have an advantage over emailed results, as email accounts are not necessarily regularly checked, and over being added into other electronically received results that they already feel are burdensome.

Interviews with practice staff

Current technology use
Practice staff reported that all clinics used medical communicate within the office using instant messaging bookings, but only in addition to traditional phone software that allows reception to track appointments and internal email. A few clinics had introduced online to bookings. Most clinics routinely used SMS, built into the medical software, to efficiently and effectively remind patients of upcoming appointments. Practice staff reported that they are not required to triage incoming electronic results (e.g. blood results) as these are automatically downloaded and kept in an electronic holding pen for GPs to check and file.

Overall, technology use by practice staff in their roles was minimal. All still used paper-based forms to collect information for new clients. Apart from this, none required patients to fill in any paper or electronic pre-consultation screening or questionnaires.

Implementation considerations
Like GPs, practice staff preferred that the tool be fully integrated into existing medical software: “somehow it goes into our software package...much like [an electronically received] result I suppose, that would be the easiest because the doctors won’t want to be searching for it in all different areas.” However, they all reported that they are also used to dealing with external information, predominantly paper-based referrals and letters which are scanned and uploaded to the patient’s electronic file.

Barriers to use
Practice staff identified a number of potential barriers to the introduction of a screening tool into their clinic. A major barrier was lack of time to manage the tool; reception staff are generally too busy answering phones and attending to patients in the waiting room to be able to do much else: “it’s so busy, so fall on”. A tool that required reception staff to register a new user on a dedicated website (e.g. to open the software, create a new profile and enter details at the time of appointment) was seen as unrealistic. Staff also felt it unlikely that they would have time to open a dedicated website to check whether arriving young people had already completed.

Practice staff were very interested in the potential of technology but only if it could take pressure off reception. Some believed requiring young people to use the tool in the waiting room on a practice-owned tablet would be the best option, given staff have the routine of handing out paper forms to new patient clients: “it would be a lot easier for them... because sometimes the phones don’t stop ringing and they don’t have much time”.

Others felt a link to the tool could be sent to patients using their SMS software and incorporated into their daily routine of messaging patients: “everyone’s mobile number is on our system so if you could create a little way that once we attend the patient or make an appointment for the patient, somehow it triggers off that this letter, as well as the link, is sent to their mobile and it’s as easy as the receptionist pressing a button in Zedmed or their software and sending it off.”
Participatory design workshop with parents

Factors affecting acceptance

Parents identified a number of factors that would encourage their acceptance of their child using the tool. Having a sense of trust and confidence in the GP was important, as was having an understanding of how the responses would be followed up: “You want some confidence that the doctor is going to look at the information, read it properly, and be sensitive with how they bring up whatever issues come out of it”.

Other factors included being informed of the tool’s purpose, the privacy and security of their child’s responses, how often the child would use it, and how health issues would be followed up. Parents also suggested the tool had the potential to facilitate their relationship between themselves and their child: “something to bring them together”.

Confidentiality of child-doctor relationship

The extent to which parents were comfortable with their child discussing health issues alone with the GP varied, depending on the particular health issue being discussed. Most parents were comfortable with their child talking alone about issues such as physical illness, exercise and diet. However, there was less agreement on more sensitive issues such as sexual health, mental health, and drugs and alcohol. A number of participants were very comfortable with their child talking about sexually transmitted infections, while others were “very uncomfortable”.

Some parents wanted to be able to view their child’s responses to the tool, while others did not. Others suggested a compromise: a “graded response generated to parents without specific information, i.e. 1=no need to worry, 5=high needs but team is managing”, although there was a recognition that this general rating could result in anxiety and a sense of helplessness for parents. All felt they would like to see a copy of the questions, so that they knew at least what their child was being asked to discuss.

DISCUSSION

This study aimed to involve all end users and stakeholders in exploring the design needs of a health screening technology for young people in general practice. We held a series of participatory and user-centred design workshops and interviews with representatives of relevant users and stakeholders: young people, GPs, practice staff and parents of young people.

Tensions in stakeholder needs

There was agreement between all groups in terms of the tool’s potential to facilitate communication and disclosure for young people with GPs. However, each group had unique requirements impacting tool acceptability and adoption, with results indicating two major tensions in stakeholder needs: method of access, and content.

“Method of access” refers to when young people and GPs would use the tool. Young people reported a preference to download and complete the screening tool on their own device in their own time. This finding is in contrast to previous studies that have developed screening tools for young people on tablet or computer for use in the waiting room, immediately prior to consultation. This suggests that, unlike the traditional paradigm by which healthcare takes place at a designated time in a dedicated clinical setting, young people want to be in control of when and where they engage with the tool. This preference may be a reflection of the emergence of online health services and the proliferation of commercial health apps where help and information is available 24/7. Interestingly, a number of small studies with adults have found that completing a technology-based health screening tool at home before their consultation is also an acceptable and feasible option for this population (Postel-Vinay et al. 2014; Slack et al. 2012).

Downloading the tool to their own device would provide young people with a sense of ownership of their own health data, in a way that they do not currently enjoy with their GP or the larger health system. It would also enable young people to complete the screening tool in a private and safe environment, which are conditions that encourage greater self-disclosure and more accurate responses (Wissow et al. 2013).

This desire to use the tool on their own device in their own time presented a challenge for GPs, who did not want to have access to young people’s responses if they were sent when GPs were not at work, when they would not be able to review the summary report and follow up high risk issues in a timely manner. One advantage of technology-based screening tools has been that they provide practitioners with immediate results, with none of the data-entry required for paper-based tools. However, previous research has used technology-based screening tools in the waiting room before the consultation (Olson et al. 2009; Forjuoh et al. 2014). This change in context of when and where the tool is used by young people turns an advantage into a disadvantage for GPs, who are also a key user group of the tool. Thus, it is important to understand how a requirement from one user group may have unintended consequences on another user group.

The contrast in the needs of young people and GPs is striking, reflecting the current wider health policy context in Australia. A key finding of the recently released National Review of Mental Health Programs and Services was that the health system has been driven by service providers rather than the needs of patients. It recommends designing services to be more patient-centred, where the focus is on the needs of patients and their families, rather than only on the needs of the provider (National Mental Health Commission 2014). Our findings provide an understanding of how a health technology can be designed to meet the needs of all users and stakeholders.

The second major tension was around the depth of health information that young people wanted to provide compared to that which the GPs wanted to receive. Young people wanted to convey the complexity and context of their lives to the GP. In contrast, GPs did not want this detail, preferring a brief and easy-to-scan summary. A solution might include a summary that displays a quick overview of key questions, while providing the option to view responses in more detail. It
may also be useful for both young people and GPs the tool to include a statement.

As well as these two main tensions, there were a number of other interesting findings. An unexpected outcome from young people was that they did not want to have additional online interventions or information incorporated into the tool. There are a number of factors that may explain this result. It may be that young participants did not see the value of these features because they did not have health issues or, if they did, were not ready to change how they accessed information. Another explanation is that young people do not want automated responses because they are flooded with impersonal information online and they want a qualified person they trust to discuss issues with them personally.

Another interesting finding from young people was that they wanted a tool that feels both being official and informal and did not see these requirements as contradictory. Previously there may have been a tendency for online information from government health websites to be perceived as credible but boring. There is perhaps now an expectation from young people that to be acceptable all online information, regardless of the source, needs to be both engaging and informative.

Unlike young people, parents are not the main users of the technology. However, they do have the right and ability to influence the design and rollout of a tool their children will use. This is particularly the case for those with children aged under 18, in whose healthcare parents often take a more active role. A key facilitator for the acceptability of the tool identified by parents was ensuring they had trust in the GP. At a minimum, parents wanted to know which questions would be asked of their child, and receive reassurance that any issues would be followed up appropriately. Indeed research suggests that parents’ views about confidentiality are complex and conflicting (Duncan et al. 2011), and that building trust in the GPs is an important way to build parental confidence in confidential health care for their children (Sasse et al. 2013).

The findings from interviews with practice staff also suggest a user group with unique needs. Practice staff suggested ways they might integrate a technology-based screening tool into their work context. For example, some would use their clinical software to send an SMS link to young people for the tool at the time of the appointment, while others would hand out a practice-owned tablet in the waiting room. This suggests that any technology developed for the general practice context needs to be flexible in order to be successfully adapted and adopted into diverse work practices and, ideally, make practice staff’s role easier.

Finally, a surprising insight from the parents’ workshop was the potential for their child’s use of the tool as being something that would bring parents and children together. Understandably, parents wanted to continue to play a role in their child’s healthcare, even while recognising young people’s growing need for privacy and independence. Interestingly, recent research found that young people also view technology as a potential ‘meeting ground’ with their parents, where time and experiences can be shared (Borca et al. 2015). Further research is needed to explore how this shared online experience may be extended to the healthcare context.

Limitations
Our research aimed to recruit participants who represented the diversity of end users and stakeholders of a technology-based screening tool in general practice: young people, GPs, parents and practice staff. While we achieved a reasonable spread of participants in terms of age range for each group, no males volunteered to participate in the parent or practice staff groups. For parents, this may be because mothers are usually responsible for taking their children to the GP. For practice staff, this may simply reflect the trend that the majority of reception and practice staff are female. Another limitation is that participants other than young people were recruited through the University of Melbourne, so that workshop participants may not have been representative of the general population. Thus, due to these recruitment and participation factors, the generalisability of our findings may be limited.

Future research
This study provides new insights into requirements for the design of health screening technology for young people attending general practice. We plan to conduct future research by building a tool informed by these results to be evaluated in real world settings. This will provide an opportunity to investigate the experience of using the tool, how it affects the relationship between young people and GPs, and whether its use can be sustained in the general practice context.

CONCLUSION
Our findings will be useful to researchers and practitioners designing health technologies in the general practice setting. Our findings regarding the impact of young people’s needs on adoption by practice staff and GPs are relevant for those seeking to design new technology for the general practice context. Further, our findings that parents differ in how they want to engage with the tool, and that trust in the GP plays a central role in acceptability, illustrate the complex factors surrounding the design and use of health technologies for young people transitioning into adulthood. However the enthusiasm for a health screening tool by our young participants suggests that if the above concerns can be addressed, a screening tool is likely to be adopted by them.

ACKNOWLEDGMENTS
This research is funded by the Young and Well Cooperative Research Centre.

REFERENCES


