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If you find me on the floor, stick some sugar in my mouth: The social production (and protection) of insulin risk among IPED communities

Kim Akrigg^{a,b}, Luke Cox^c, Luke A. Turnock^d, Andrew Richardson^e and Timothy Piatkowski^{a,b}

^aSchool of Applied Psychology, Griffith University, Mount Gravatt, QLD, Australia; ^bGriffith Centre for Mental Health, Griffith University, Brisbane, QLD, Australia; ^cSchool of Sport and Exercise Science, Swansea University, Swansea, Wales, UK; ^dSchool of Social and Political Sciences, University of Lincoln, Lincoln, UK; ^ePopulation Health Sciences Institute, Newcastle University, Newcastle upon Tyne, UK

ABSTRACT

Introduction: Insulin is used among image and performance enhancing drug (IPED) communities for its anabolic effects, but its use carries significant risks, with the acute danger being hypoglycaemia, which can be life-threatening if not properly managed. Within these communities, harm reduction practices and informal peer knowledge exchange play a critical role in the way substances are consumed. This qualitative study sought to understand these community practices regarding non-medical insulin use among people who use IPEDs.

Method: Semi-structured interviews were conducted with people who use IPEDs, and specifically, insulin. Participants were asked about their risk practices, harm reduction strategies, and the community dynamics that shape their use of insulin. Our analysis centred on how social and material networks of peers, technologies, and information flows contribute to the social production and protection of risk.

Results: The study involved an international cohort of 14 participants (13 men, 1 woman, aged 25-45, $M=33.34$) who used insulin for non-medical purposes. The analysis revealed two themes: Intersecting Risks, which encompassed the physical, psychosocial, and self-imposed risks associated with insulin use, and Social Protection of Risks, focusing on community-driven harm reduction strategies. People who use insulin actively construct risk through community-driven knowledge and informal education. Social protection is facilitated through peer networks, where harm reduction strategies are shared.

Discussion: This research underscores the importance of community-care in harm reduction and challenges individualised models of risk management. It highlights the need for community-centred health interventions that recognise the relational dynamics of risk management among IPED-using communities.

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Introduction

Insulin is medically prescribed for diabetes management, however, its anabolic properties have attracted attention from people within bodybuilding communities who seek to use it non-medically to enhance muscle mass and recovery (Ip et al., 2012). The non-medical use of insulin has become prevalent within certain fitness communities, and is often 'stacked' in combination with other image and performance enhancing drugs (IPEDs) such as anabolic-androgenic steroids (AAS) (Piatkowski & Cox, 2024). Despite the perceived benefits, the non-medical use of insulin carries significant health risks, including life-threatening hypoglycaemia and long-term health complications (Ben-Ami et al., 1999). Access to insulin, along with unregulated information shared within these

communities, has facilitated its illicit use across various regions. Furthermore, the role of online forums and social media platforms (e.g., YouTube) in disseminating guidance on insulin use potentially exacerbates these dangers by promoting unsupervised and unregulated practices within and across the community (Cox & Paoli, 2023; Paoli & Cox, 2024). While the use of insulin was once restricted to a select few within IPED communities, some tentative claims can be made towards an increasing normalisation of insulin use for goals related to enhancement. This underscores the urgent need for more robust harm reduction strategies and policy interventions to tackle this emerging health risk. This research aimed to build knowledge and understanding of non-medical insulin consumption and management practices among communities of people who use IPEDs, to inform harm reduction strategies.

CONTACT Timothy Piatkowski  t.piatkowski@griffith.edu.au  School of Applied Psychology, Mount Gravatt Campus, Griffith University, Brisbane, QLD 4122, Australia.

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Background

In clinical practice, insulin is a critical therapeutic agent for individuals with type 1 diabetes mellitus, serving as the primary means of blood glucose regulation (Perkins et al., 2021). Insulin administration is typically achieved through subcutaneous injection, with pharmaceutical advancements yielding a diverse array of insulin analogues designed to more closely approximate the physiological profile of endogenous insulin secretion (Kamal et al., 2006). These analogues are categorised based on their pharmacokinetic properties, ranging from rapid-acting formulations (e.g., Humalog, NovoRapid), which appear in the bloodstream within 5-10 minutes and exhibit a duration of action of 4-6 hours, to long-acting preparations (e.g., Lantus, Optisulin) that maintain their effect for over 24 hours. While the therapeutic benefits of insulin have been established within strict clinical trials, a substantial body of research has recognised various adverse effects associated with insulin use in diabetic populations, including weight gain (Holt & Sönksen, 2008). The most clinically significant and potentially life-threatening adverse effect associated with insulin use is hypoglycaemia, characterised by a marked reduction in blood glucose levels which if left untreated, can result in severe hypoglycaemia, leading to coma and, ultimately, death (Evans & Lynch, 2003; Konrad et al., 1998; Rich et al., 1998).

Insulin is a hormone which plays an integral role in glucose regulation within both the body and brain and exerts anabolic effects on muscle and adipose tissue, rendering it an attractive option for people seeking to increase muscle mass when combined with strength training (Holt & Sönksen, 2008; Konrad et al., 1998). Insulins capacity to stimulate muscle protein synthesis contributes to enhanced muscle hypertrophy, improved nutrient delivery, and accelerated recovery (Fink et al., 2018; Pope et al., 2014). Moreover, insulin facilitates glycogen storage in skeletal muscle, potentially augmenting muscle fullness and endurance during exercise (Anderson et al., 2018). The potent anabolic properties of insulin have led to its use as a performance-enhancing aid, particularly among strength athletes such as bodybuilders and powerlifters. Insulin is increasingly sought for non-medical purposes, with previous research highlighting its significant use within these communities (Evans & Lynch, 2003). This underscores the notion of therapy and enhancement distinction, where medicine designed for therapeutic ends is used 'off-label' for enhancement purposes. Indeed, in this instance, the distinction is clear, with people in IPED communities seeking enhancement rather than therapy.

Information regarding insulin administration and dosage is generally disseminated via 'word-of-mouth' and often procured from 'black-market' dealers or pharmacies (Rich et al., 1998). In more recent times, social media platforms (e.g., YouTube and Instagram), have become locations for such information sharing and, in some cases, even providing a location to market and facilitate the purchase of such products (Cox & Paoli, 2023; Paoli & Cox, 2024). Off-label use of insulin carries numerous potential health risks for people who use these drugs, including hypoglycaemia, coma, seizures, brain damage, complications due to injecting, development

of insulin resistance, and type 2 diabetes (Cohen & Hickman, 1987; Kamal et al., 2006; Konrad et al., 1998; Zierath et al., 2000). These health concerns become further compounded by the fact that most people who use IPEDs do not disclose their usage of these drugs to medical providers due to fear of stigma and issues of legality (Cox et al., 2024; Piatkowski et al., 2024c). Coupled with inadequate and unequal health-care responses available to people within their respective countries and around the world, this further underscore risk and adverse health outcomes.

Although AAS are believed to be used by 6.4% of men (Sagoe et al., 2014) and 4% of women globally (Piatkowski et al., 2024e) we lack concrete prevalence rates for other IPEDs such as insulin. Current literature indicates that between 5.3% and 25% of people who have utilised AAS have incorporated insulin into their training regimens (Ip et al., 2012). However, prevalence studies are scarce and largely limited to Western populations, meaning there are gaps in our knowledge and understanding which limit harm reduction strategies. Nonetheless, we recognise the serious and life threatening risks associated with insulin use, which can precipitate hypoglycaemia, a condition characterised by dangerously low blood glucose levels, potentially resulting in seizures, loss of consciousness, and, in severe cases, death (Kamal et al., 2006), which provides the fundamental need for this research. To address and mitigate the potential adverse consequences associated with insulin use, a more comprehensive understanding of non-medical insulin use is imperative.

Unlike regulated sports organisations, people using IPEDs outside these arenas are subject to varying national policies. Approaches range from prohibiting sales to criminalising possession and use, often mirroring measures for illicit recreational drugs (Henning & Andreasson, 2022; Piatkowski et al., 2024c). These different responses muddy the water, leading some people within IPED communities unsure where to turn. In some countries, insulin is even available over the counter, underscoring vast geographical differences in regulation (Cox et al., 2023; Turnock et al., 2023). In Australia, for example, according to the Therapeutic Goods Administration (TGA), insulin is classified as a Schedule 4 prescription only medication, which may only be legally obtained with a valid prescription from a registered medical practitioner. As such, it is not approved by regulatory authorities in Australia for non-medical purposes. These legal disparities complicate global efforts to consider approaches toward non-medical insulin use for performance enhancement, and despite bans or restrictions, people continue to access and use IPEDs, including insulin, without prescriptions (Ip et al., 2012; Piatkowski & Cox, 2024). Legal frameworks have, therefore, contributed towards and shaped illegal markets, where fake and counterfeit medications are known to be available online (Hall & Antonopoulos, 2016). One potential reason for the increase in IPEDs, specifically insulin, is the enhanced accessibility of such drugs (Cox et al., 2023; Turnock et al., 2023; Turnock & Gibbs, 2023) and information about these substances through social media platforms (Cox & Paoli, 2023; Lamb et al., 2024). While conversations regarding the use of IPEDs were once kept underground, 'IPED influencers'

(Cox & Paoli, 2023; Paoli & Cox, 2024) have created a space which can be said to somewhat popularize IPEDs. As a result of these merging on-and-offline environments (Andreasson & Henning, 2023) peer influence plays an integral role in the generation of knowledge regarding these substances, relying on 'folk pharmacological knowledge', 'bro-science', or ethnopharmacology (Kotzé et al., 2023; Monaghan, 1999, 2002).

Ethnopharmacological practices within the IPED community can be conceptualised as a form of 'folk science' developed and shaped by members of the community. This body of knowledge encompasses community-derived understanding of substance use, effects, and associated risks, alongside lived-living expertise, cultural context, and adaptations of medical knowledge (Monaghan, 2002; Piatkowski et al., 2024b). Though the dissemination of information ought to be scrutinised, the IPED community has responded to apparent gaps and inadequacies evident throughout various governmental approaches to IPEDs. Community information sharing is disseminated through informal networks, embedded within specific cultural contexts, and incorporates collective experience-based harm reduction practices. Within this community, IPEDs are often not perceived as taboo but are considered a norm and component of training (Santos & Coomber, 2017). Information is shared among peers, with credibility often ascribed to individuals who exhibit greater muscularity and size (Monaghan, 2002) as well as those who have a higher level of 'chemical capital', defined by their experience with a range of IPEDs (Kotzé & Antonopoulos, 2021; Piatkowski et al., 2024b; Piatkowski & Cox, 2024). These networks are typically non-judgemental environments which provide a safe space for community members seeking support and advice related to IPEDs (Turnock & Townshend, 2022). As people who use IPEDs perceive stigma from healthcare professionals, the importance of these informal advice networks is clear for this population (Richardson et al., 2024). Given that protocols of insulin use appear to be disseminated primarily through peer networks, the nature of the community becomes a critical factor in considering how insulin-related risks are managed and mitigated by these people and through the various information channels they create to funnel such information to the people who need it.

Scholars have recently identified the need for IPED-using communities to be informed about insulin risk (Piatkowski & Cox, 2024); however, effective strategies of contextualising and responding to this risk have not yet been explored. The need for this research is further underscored by the major health risks associated with insulin use, which are some of the most significant within the IPED category. Thus, understanding the way that insulin risk is produced and protected against among IPED-using communities is crucial for identifying key pressure points, risk behaviours, and developing effective responses, grounded in autonomy, and delivered in a non-judgemental manner. By examining how this community perceives and manages risk, we can better contextualise insulin use and craft more targeted, informed strategies for harm reduction which responds directly to the dynamic needs of this population.

The production of risk

In understanding the risks associated with drug use, particularly among stigmatised groups like people who use IPEDs, it is critical to look beyond deterministic or static models of risk. The social production of risk offers a more nuanced perspective (Rhodes, 1997; 2002 Rhodes & Treloar, 2008), highlighting how risks are not merely encountered by people within predefined environments but are actively constructed and produced through social, economic, and political processes. Risk is shaped by peer networks, community norms, and broader structural factors, such as policy frameworks or healthcare access. Collectively, each of these different facets unearth specific vulnerability when risk is considered. In doing so, this framework moves beyond the idea of risk as a direct consequence of exposure, instead emphasising how risk is socially constructed, with certain behaviours becoming coded as risky or acceptable depending on the socio-cultural contexts in which they take place. This resembles context and community specific assessments whereby risk is situated along a sliding scale. At one end of the scale, practices might be deemed to carry little to no risk, however, at the other side of the scale, risk is significant, clear, and actively avoided.

In this context, the social production of risk also involves a process of negotiation where people and their communities reinterpret and manage risks according to local knowledge, shared experiences, and peer-driven practices (Piatkowski et al., 2024d). For example, while mainstream medical discourse frame insulin use outside of diabetic treatment as inherently dangerous (Rich et al., 1998), bodybuilding communities negotiate risks through community knowledge exchanges, collective, learnt and shared practices, and in doing so, actively reframe insulin use as a manageable part of performance enhancement. Here, informal education and peer advice networks serve as key mechanisms in shaping perceptions of what is risky and how such risks can be mitigated or minimised within the community. This is not to suggest that risk disappears but that its meaning and management are socially constructed, relational, and constantly shifting in what ought to be considered a fluid and dynamic continuum which is susceptible to various factors and influences.

Complementing the notion of the social production of risk is the concept of social protection of risk (Rhodes et al., 2017), which acknowledges that individuals and communities also engage in practices of collective care and protection to manage, reduce, and mitigate harm. This idea shifts focus from individualised risk management towards collective, community-driven strategies that seek to protect people from harm within their social contexts (Fraser, 2013; Rance et al., 2018; Rhodes et al., 2017). In IPED-using communities, particularly with substances like insulin, social protection can take the form of knowledge-sharing networks, peer-led harm reduction efforts, or even informal healthcare practices where people exchange tips on safe administration, dosage, and managing side effects. These practices serve as sites of social protection, where risk is buffered through the circulation of collective knowledge and practices of care that challenge

biomedical narratives of risk (Fomiatti et al., 2020; Fraser et al., 2020; Seear et al., 2012). These layers of protection funnel various aspects of information and advice, responding to inadequate levels of governmental support for the people who use IPEDs. Protective mechanisms are often essential in communities where formal healthcare services are either unavailable, inaccessible, unequal, or stigmatising towards the person seeking help (Fraser et al., 2020). For example, in the UK and Australia, service delivery for needle and syringe programs (NSP) are said to vary between and across regions (Kimergård & McVeigh, 2014; Turnock & Mulrooney, 2023) with perceptions of stigma pushing people who use IPEDs away from engaging with NSPs (Cox et al., 2024).

These sites of social protection can be understood as spaces where care is relational and material, enacted through practices that both produce and protect against risk. Annemarie Mol's (2008) concept of the logic of care is particularly relevant here, emphasising that care is not merely administered by experts but actively shaped through social relations. Framing risk and protection in relational terms allows us to see these practices as part of a sociotechnical system that actively shapes the experience and management of risk. In this view, risk is not simply an individual or environmental factor, but something co-produced by social, material, and political relationships. The social production and protection of risk in IPED-using communities, particularly around substances like insulin, cannot be disentangled from the wider network of actors, technologies, and social norms that mediate these practices. This relational and material view of risk and protection highlights how communities enact their own forms of care, creating alternative structures of support that often fill the gaps left by formal health systems (Piatkowski et al., 2024d). By taking this theoretical lens, we continue to challenge the individualised responsibility models prevalent in public health and policy, advocating for a community-centred approach to understanding and addressing drug-related risks, particularly for people who use IPEDs.

Method

Study design

This was an exploratory qualitative study. Griffith University ethics committee approval was sought prior to study commencement (Approval Number: 2024/308).

Sampling and recruitment

Participants were eligible for inclusion by being aged 18 years or older who were using IPEDs, and concurrently utilising insulin for non-medical purposes (e.g., enhancement). Participants were recruited via a purposeful sample method whereby the lead authors' personal and professional networks within IPED communities was drawn upon to recruit. The lead author leveraged his network by word-of-mouth communication to identify participants. After initial contact with participants had been made, the researcher requested that the

study details were shared amongst peers who shared similar experiences and behaviours. This supplemented purposive sampling and data collection with additional participants recruited through snowball sampling. Recruitment continued until theoretical saturation was achieved, as evidenced by the absence of new emerging themes from interviews. The coding and analytic process persisted until reaching inductive thematic sufficiency, signifying the point at which the accumulated data ceased to offer new and significant insights aligned with the research objectives (Guest et al., 2020).

Materials and data collection

Interviews were conducted between June to August 2024 and were between approximately 15 and 50 minutes in duration ($Mean=28.33$, $SD=12.23$). All interviews were conducted online through videoconferencing (via Microsoft Teams). A semi-structured interview style was used to guide interviews, supported with open-ended questions to attain detailed and insightful responses. Interview guides included a set of questions consistent 'prompts', initial questions were related to gathering background information about the participant's IPED use and building rapport. Other questions were related to the study and its aims, such as their experience with hypoglycaemic events, harm reduction strategies, and their perception of risks of insulin for non-medical purposes. For example, questions included 'Have you experienced any harms from using insulin?', 'What do you think about the risks of insulin use?', 'Is there any harm reduction strategies you're employing?'. No reimbursements were provided for participation.

Data analysis

Our analytical framework is informed by perspectives that emphasise the relational, process-oriented nature of reality (Mol, 2002). Rather than treating insulin risk as a static or pre-existing factor, we approached it as something produced through the dynamic interactions between social, material, and institutional actors. In this way, the concept of risk was fluid, subject to temporal change and in this analysis, understood as emergent within a network of relations, shaped by the practices of people who use insulin as part of their wider IPED practices, the social norms governing these practices, and the policy frameworks that regulate or constrain them. This approach enhanced the interpretive framework with insights from firsthand understanding of these specific IPED-community dynamics. To operationalise this ontological approach, the authors used this insight and understanding as a tool to explore how different social dynamics interact to produce specific risk practices and perceptions. It allowed researchers to trace how risk is enacted in the daily lives of participants, emerging from the interplay between their substance use practices, health and social care interactions, and policy landscapes.

Researchers analysed interviews and observational data iteratively (Neale, 2016), coding for key relational dynamics that illustrate how risk is constituted within peoples' lives. This process involved identifying moments where risk was

framed by participants in terms of care, social support, harm reduction, and institutional constraints. These moments of risk production were then mapped onto broader socio-structural factors, helping to trace how the materiality of insulin use intersects with the political and social dimensions of peoples' environments.

Results

The participants comprised 14 (13 men and 1 woman) people who were using insulin for non-medical purposes aged 25-45 (*Mean age*=33.34, *SD*=6.27). The sample was international but was dominated by participants from Australia (*n*=8, 57.14%), with other participants coming from Thailand (*n*=2, 14.38%), United States of America (*n*=1, 7.14%), Mexico (*n*=1, 7.14%) and Canada (*n*=1, 7.14%) (see Table 1). The participants interviewed had used IPEDs for a period between 1.5 to 15 years (*M*=7.96, *SD*=4.04). IPEDs commonly used by the cohort comprised testosterone, drostanolone, trenbolone, among others (see Table 1 for full list of other IPEDs). Participants reported the brands of short-acting insulin they were using as Humalog (5), NovoRapid (4), and long-acting Lantus (7), and Optisulin (2). The typical dose ranged between 4–20 IU per instance of use. Participants reported numbers of hypoglycaemic events experienced from 0 to 10+ (*Mean events*=5.64, *SD*=5.81). There were two overarching theme-categories identified and developed from the data, Intersecting Risks, and Social Protection of Risks. Within the results section, quotes are denoted in italics with each participant's age and participant pseudonym prior to the quotes.

Theme 1 intersecting risks

Subtheme 1.1 initiating use

Participants were drawn to use insulin through a gradual exposure to risk, typically following experience with more

common IPEDs. Insulin was not identified as the first IPED these people used, but rather as one utilised subsequently following the use of more commonly known IPEDs, such as AAS. Many participants expressed hesitancy toward the potential risks associated with insulin, due to its reputation as a 'dangerous compound'. This concern led participants to seek advice from what they perceived to be trusted sources including people with diabetes, medical professionals with IPED knowledge, and personal research via academic journals and online forums. In this sense, people moved along and progress through IPEDs perceived to be more and less risky. While insulin's reputation created initial reservations, its potential to enhance performance overshadowed some fundamental reservations and drew participants to explore it further.

Dorian [M, 29, Australia]: I think insulin, it was always something that I knew about, something that had that stigma around being a dangerous compound. It was something I wanted to do some research on. It's not an anabolic androgenic compound, and it still is great for performance. So, I just wanted to look at that as an option.

Several factors motivated participants to take the step between 'exploring' and 'using' different drugs. A common reason for using insulin was reportedly its' usefulness during the 'off-season' (outside of competition) period. During this time, bodybuilders focus on increasing muscle mass, strength, and size before the pre-competition 'cutting' (period of eating at a calorie deficit to lose body fat) phase. Insulin was viewed as an effective tool for increasing muscle size and improving recovery during the 'cutting' period. Other reasons included managing high carbohydrate intake and recommendations from coaches or peers. High carbohydrate consumption is a crucial aspect of bodybuilding diets which can carry negative side effects, such as fatigue. Participants reported that insulin was effective in managing these dietary demands and improving recovery. Again, this outlines how people weigh up the risks and rewards, with IPED use, end goals and adverse

Table 1. Participant information.

Pseudonym	Age	Years of IPED use	Gender	Type of Insulin	Number of IUs	No. of Hypoglycaemic Events	Residence
Dorian	29	5	M	Humalog R5 Optisulin	5-20	10	Australia
Rowan	28	10	M	Humalog R	10	1	Thailand
Gavriel	37	10	M	Humalog R	6-10	7	Mexico
Chaoi	26	2.5	M	Lantus	20	5	Australia
Rhys	25	3.5	M	Nova-Rapid Humalog Lantus	5-10	10	Canada
Cassian	30	8	M	Lantus Humalog	4-6	10	Thailand
Keir	40	15	M	Lantus	5-10	0	Australia
Archer	32	10	M	Lantus	4-15	2	Australia
Cain	42	5	M	Lantus	10+	0	Australia
Lysandra	45	1.5	F	Novo Rapid Lantus	10	1	Australia
Sam	30	9	M	Humalog	4-7	1	United States
Roland	32	8	M	Optisulin Novo Rapid	4	0	Australia
Gavin	32	14	M	Novo Rapid	8-10	10	Australia
Lorcan	40	10	M	Lantus Novo Rapid	2-20	20	Australia

Note. IUs: International Units.

health risks considered within a delicate balancing and trade-off assessment.

Roland [M, 32, Australia]: I've always been curious about it, and one of my friends does cycle protocols, and I decided to take nutrition a little more seriously. I was eating up to 500 grammes of carbohydrates a day [...]. But, I was feeling very sluggish, and I was feeling tired from all the carbohydrates. He recommended that I take 5 IUs of Optisulin [long-acting insulin] and I felt immediately better, within one or two days.

Social networks, particularly within communities of people who use IPEDs, were significant contributors to the concept of risk, its understanding and potential mitigation. Aesthetic and performance goals, coupled with group norms surrounding body image and athletic performance, helped normalise insulin use within these circles, softening perceptions concerning risk, contributing to an increased openness regarding use and harm.

Subtheme 1.2 peak physical risk – hypoglycaemic coma

Hypoglycaemic events, along with secondary outcomes such as coma or death, were identified as the primary physical risks participants actively sought to avoid. Most participants had experienced at least one hypoglycaemic event, something which underscores the serious reality of insulin use, with some reporting nearly daily occurrences. However, participants generally expressed minimal concern, attributing this lack of concern to their confidence in recognising symptoms and managing them effectively. These distorted perceptions of risk hold significance when harm reduction and education is considered, with some individuals perhaps less likely to engage or consider that they might need support when IPEDs are considered. Chao's experience illustrated how engaging in strenuous physical activity, like gardening after an intense leg workout, can exacerbate the risk of hypoglycaemia when insulin protocols are not properly calibrated.

Chao [M, 26, Australia]: I'd come home, and I'd be doing gardening after my leg workout, for example, so big workout outdoor activity, and then [go hypoglycaemic]. In hindsight, the protocol was not correct based on how many carbohydrates I was consuming with that level of activity.

The subjective impact of hypoglycaemic events varied, with some participants reporting light-headedness and cognitive impairment, while others described more severe symptoms such as blacking out and confusion over whether they had just prepared food or not. This illustrates an inherent diversity within participants' perceptions and experiences of adverse health events, underscoring the need for dynamic responses.

Interviewer: Have you ever had a hypoglycaemic event?

Rhys [M, 25, Canada]: Yes, actually multiple times. [...] Every time I would inject the right side, I would have a hypoglycaemic episode and then would start sweating, dizziness, lightheadedness, kind of feeling [like I'm going to] black out. So, what do I do? Just take in as much carbs, sugar as I can, not really caring about the caloric content at that point, just to ensure I don't black out.

Participants became adept at anticipating when hypoglycaemia might occur, adjusting their practices to reduce potential for harm accordingly. Indeed, this knowledge was

acquired and learnt through doing, whereby people garner insight through personal experience, understanding where heightened vulnerability and risk occur. Some participants attributed their avoidance of hypoglycaemic episodes to strict adherence to instructions from their coaches, while others acknowledged that lapses in food monitoring, skipped meals, or being distracted were contributing factors when hypoglycaemic events did occur.

Rowan [M, 28, Thailand]: About three o'clock I realised I hadn't eaten because I was getting very shaky, and I was like oh fuck, I'm going hypoglycaemic.

While participants agreed there was some level of risk, they acknowledged using IPEDs was a matter of taking calculated risks, which were co-constituted through material and social practices. To this end, people implement various strategies to reduce the potential of adverse health events and the severity of risk should it occur.

Subtheme 1.3 social risk and risk production

The varying spectrums of how participants weigh risk was of interest. Risk is not simply a result of individual decisions but is socially produced through interactions of environmental factors. Social networks play a significant role in how participants view, dismantle, understand, and engage in risky behaviours. The norms within the community dictate what is considered acceptable or risky, creating a shared understanding that can exacerbate or mitigate risk. However, these norms are liable to shift and are subject to temporal influence.

Rhys [M, 25, Canada]: I mean risk level awareness are pretty high. I'm aware of what could potentially go wrong. I also do personally believe that a lot of things are overblown, in reality. There's reasons why there's big, big warnings around it.

The social environment within the community of people who use IPEDs significantly shaped how individuals perceived and contextualised the risks associated with insulin use. Many participants turned to their peers for advice prior to starting insulin, and while some initially felt apprehensive, peer recommendations often helped alleviate these concerns, softening perceptions of risk, providing reassurance and guidance through information provision and direction. Their information sources included online forums, coaches, peers, and people with diabetes. However, some participants perceived the withholding of insulin-related information to be a protective measure:

Chao [M, 26, Australia]: I don't think there's enough education around it. But I don't think there's a problem with that either, because as soon as you make something accessible with information, you get Chinese whispers [the process of information becoming increasingly distorted as it is passed from person to person], and then somebody's down on the floor because they had the wrong amount of IUs. I think it's better that it's still fairly taboo.

Participants reported a reluctance to seek advice from general practitioners due to the stigma surrounding insulin use and concerns associated with various other IPEDs. This hesitancy prompted many individuals to rely on peer

networks, where they experienced a greater sense of trust and understanding. Peers with higher levels of social capital—encompassing trust, norms, and relationships within the community—demonstrated greater influence on how individuals perceived and managed risk. Those with more chemical capital influenced other community members' risk perception and management strategies. Indeed, peers with lived/living experience were more relatable to the participants than healthcare providers, who had garnered knowledge through doing and had earned merit through their engagement and commitment to their craft. This currency within the community was enough to blur boundaries and shape perceptions of risk, influencing drug use in various ways. However, as Roland shared, participants expressed a desire for healthcare providers to demonstrate greater understanding and willingness to collaborate:

Roland [M, 32, Australia]: If I was to go to a doctor and talk to them about my insulin use, they'd probably just shun me, and they've done that with steroid use as well. If it was more of an open conversation like, "hey, Doc, I'm gonna do this whether you like it or not. I'd rather come to you and do blood tests. You can kinda, not guide me, but just tell me I'm doing OK".

The absence of understanding and support from medical professionals was something that influenced risk but also exacerbated participants' desire to seek guidance from peers who share similar experiences, a process that also contributed to perceptions of risk. As a result, peer norms significantly shaped participants' attitudes toward insulin use within their communities. Consequently, in environments where insulin use, and discussions were evident (e.g., gyms, online forums), people were more likely to experiment with use, overlooking potential risk. While some participants openly shared their experiences with insulin among peers, others opted for discretion, believing that maintaining secrecy could protect community members from normalising risky practices, as Dorian noted:

Dorian [M, 29, Australia]: So, when I decided to try insulin, it was sort of around the time I'd started working with a number of people who knew a lot more about this sort of stuff than I did, [...] and had the discussions with them about what insulin is, and how safe it is to use, and they explained to me that it isn't as dangerous as people are led to believe. It's a good tool for the job that you're trying to achieve.

Participants displayed a range of perspectives on the risks associated with insulin use. Many felt confident in their ability to manage the risks, often attributing risks to inconsistencies in insulin management, or insufficient education rather than inherent dangers of the substance itself. Some even contended that concerns over insulin were overstated, especially when juxtaposed with the risks of more harmful substances.

Dorian [M, 29, Australia]: There's always a worse option. They could be doing meth [methamphetamine], like, a little bit of testosterone isn't a big deal in the grand scheme of things.

This spectrum of risk perception underscores the intersection of comparative risk assessment and normalisation of risk in communities of people who use IPEDs.

Theme 2 social protection of risk

Subtheme 2.1 Ethnopharmacological knowledge

Participants had a strong motivation to minimise adverse health harms associated with insulin use by placing health as a priority within drug regimes. Their further strategies, such as health monitoring behaviours and using minimum viable dosages underscored this overall goal and focus on harm reduction.

Sam [M, 30, United States]: I wanna be as safe and as responsible as possible. So, I think we're doing it, just on a lot more health conscious basis.

Participants actively integrated their lived-living experiences with ethnopharmacological practices into their harm reduction strategies to mitigate health harms. As shared by Rowan, most study participants reported adhering to meticulous regimens encompassing harm reduction strategies and overdose prevention protocols. These self-imposed practices predominantly included the administration of minimal dosages, utilising trusted sources, and the implementation of safe injecting techniques:

Rowan [M, 28, Thailand]: I think regular blood work is something I would consider harm reduction. Regularly checking your blood pressure, regularly checking your fasting glucose, are two forms of harm reduction to ensure those are within acceptable ranges in combination, just having the mindset that you want to use as little as possible [...]. Making sure you're at least getting a prescription. Consulting with a medical practitioner, don't buy shit made from people's bathtubs, or that you don't know where it is from. Try to get things from a pharmacy. Then, I think basic things would be correct administration protocols, use clean, sterile instant syringes, use alcohol swabs, swab the area, safe injection practices.

Several participants employed specific strategies to mitigate the risk of hypoglycaemic coma and other insulin-associated harms. One common practice was ensuring the availability of fast-acting carbohydrates, such as GlucoJels (glucose-based lollies often used for a quick energy boost), during insulin administration as a precaution against hypoglycaemia. While the presence of another person was not universally considered essential, many participants recognised the value of having others aware of their insulin use in case of a hypoglycaemic episode. To this end, insulin use encouraged an enhanced layer of openness to protect the health of the people using these types of drugs. This goes against some existing cultural norms where drug use might be kept in the shadows but appears essential for health protection.

Interviewer: Did you have someone around when you're using [insulin]?

Keir [M, 40, Australia]: Yes, absolutely. If I was using insulin, I'm always using it around the time of a high amount of carbohydrates, anyway. If I did have a hypoglycaemic moment, I have something nearby. I have my partner know what I'm doing and why, and if you find me on the floor, stick some sugar in my mouth.

Subtheme 2.2 collective risk management

Social networks of people who use IPEDs play an important role in how people conceptualise risk, and alongside this their willingness to share advice about insulin with others in

the community. Many participants reported having given advice to others and emphasised the importance of being honest with others to avoid creating false expectations and blurring boundaries regarding how people consider and assess risk. Additionally, demonstrating caution and prioritising standards of care and discipline around standard routines were evident amongst participants, alongside a willingness to research insulin use. These strategies were cited as protective factors to mitigate adverse health outcomes associated with insulin use and were shared by members of the community to the wider IPED community. Several participants mentioned willingness to share about their negative experiences with peers as a protective measure.

Gavriel [M, 37, Mexico]: I have shared the [insulin] protocols, because a lot of other people were getting the wrong information, and I shared my own experience and story, and I made sure that they are educated and they understand how long insulin lasts in the body, how many grammes of carbs you need to have, and that you need to have backups for your own safety so that something doesn't happen, and to know the signs coming on of if you are going hypoglycaemic.

Advice shared between IPED community members included dosages, carbohydrate requirements and benefits and risks expected with insulin use. Participants frequently mentioned being cautious when giving advice and wanted to ascertain how 'ready' a prospective person was in their IPED journey in order to minimise risk to the individual. Determining whether someone was ready or not to make the jump and use insulin is clear point of contention, with certain members of the community playing the role of gate-keepers. Scholars have drawn similar parallels between IPED initiation more generally (Antonopoulos & Hall, 2016) as well as dinitrophenol use (McVeigh et al., 2017). In these situations, these individuals hold a fundamental role within risk management, holding the keys to community care and safeguarding. Importantly, people who were less experienced using insulin reported wanting to feel more proficient with the substance prior to sharing information to the wider IPED community.

Rhys [M, 25, Canada]: I just kind of mentioned how the risks are definitely overblown, and if you follow a low and slow protocol build up, monitor this, and really be on top of your stuff it's not as harmful. I just haven't brought it up 'cause I also don't want to put the idea in their mind.

Participants had mixed responses when it came to sharing individual protocols with others. Some people believed sharing protocols they evaluated could be protective for others, as it would prevent them from taking poor advice elsewhere. Conversely, others reported that they did not want to divulge their routines as they felt a sense of responsibility to others in case of potential harms that could arise through such information sharing.

Lorcan [M, 40, Australia]: I just wouldn't have faith in giving that information to anyone else. I did early on, massive mistake. I gave my protocol to a new bodybuilder, that did not go well at all, he just kept going hypo all the time. I learned from that pretty early on, so I didn't really give it out after that.

Social capital plays as significant role in how individuals in the community gain access to resources, information, and support. Trust and mutual assistance are critical, especially within a subculture that operates on margins of legality.

Discussion

This study aimed to understand how IPED communities perceive and manage risk, to further inform the development of harm reduction strategies for people who use IPEDs, and more specifically, insulin. IPED consumers navigate risk within complex environments shaped by social, economic, and policy factors, influencing both access to substances and exposure to harm (Kimergård & McVeigh, 2014; Salinas et al., 2019; Santos & Coomber, 2017). Gyms, online marketplaces, and peer networks not only facilitate substance access but also shape decision-making and harm reduction strategies (Santos & Coomber, 2017). This is evident in the initiation of insulin use, which, like other IPEDs, is often influenced by peers, coaches, and digital communities (Paoli & Cox, 2024). Many participants viewed insulin as safer than synthetic IPEDs due to its approved medical use, despite its significant health risks, including acute overdose death. For insulin specifically, due to the apparent lack of support available to IPED consumers, they employ various risk management strategies to mitigate potential adverse effects associated with insulin use, including maintaining readily accessible fast-acting carbohydrates for hypoglycaemic prevention, gradually titrating dosages to assess individual tolerance, and adhering to safe injecting practices. The findings demonstrate the importance of community-driven approaches for development and implementation of harm reduction measures. Due to the absence of a significant healthcare response to IPED use, there is a paucity of care available for communities of people who use IPEDs. The lack of a harm reduction framework leaves the onus of creating these frameworks on the community to be self-managed. While some 'DIY' interventions have arisen within the IPED community (Henning & Andreasson, 2022), such as drug coaches (Gibbs et al., 2022; Piatkowski et al., 2024b), these are limited by a range of factors, including legality (Piatkowski et al., 2024a).

In Australia, punitive legislation criminalises IPED use, thereby creating barriers for people seeking IPEDs through licit means (Piatkowski et al., 2024c). In contrast, other countries exhibit different regulatory landscapes and access dynamics. In North America, access to IPEDs also differs from Australia; while the U.S. and Canada have both legal and illicit supply chains (McBride et al., 2018), insulin's availability in underground markets is limited by regulatory constraints (Maycock & Howat, 2005). However, in Thailand, where pharmaceutical regulations are comparatively less restrictive, individuals may encounter fewer obstacles in acquiring IPEDs (Piatkowski et al., 2025). Regulatory landscapes shape not only access to IPEDs but also how risk is managed. In restrictive settings like these, underground procurement fosters secrecy and misinformation, reinforcing stigma and limiting harm reduction. In more permissive contexts, easier access does not always mean safer use, as structured harm

reduction frameworks may be lacking (Henning et al., 2021). Across these settings, the absence of open discourse on risk contributes to a socially produced risk environment.

The prevailing approach of stigmatising insulin uses as inherently dangerous, coupled with a reluctance to engage in open discourse, inadvertently contributes to the socially produced risk environment. By staying silent and not engaging in open discussions on risk mitigation, individuals are deprived of clear guidelines or comprehensive harm reduction frameworks, further perpetuating stigma and misinformation (Richardson & Antonopoulos, 2019). This aligns with Duff's (2010) observation that while risk environments expose individuals to harm, they also have the potential to function as enabling environments, especially when protective resources are present. That is, while the social environment can contribute to the normalisation of risk, softening perceptions and potentially contributing towards riskier behaviour, it simultaneously functions as a site of protection (Fraser, 2013; Fraser et al., 2016; Rance et al., 2018; Rhodes et al., 2017). In this context, experienced members of the IPED-using community, such as coaches, play a critical role by filling the gap left by formal harm reduction frameworks. IPED communities do not merely navigate risk but co-construct it, drawing on bodily knowledge, lived experience, peer advice, and community-driven protocols. This reimagining of the *production and protection* of insulin risk invites further exploration of how community-derived strategies can inform broader public health responses, particularly in contexts where formal harm reduction guidance is lacking or ineffective. Consequently, this study contributes to a more comprehensive understanding of the socio-structural determinants of both harm and resilience, advocating for harm reduction approaches sensitive to the lived-living experiences of those at risk.

The current dynamic of what we term here - 'silence as a strategy' - underscores the necessity of transitioning towards a model of collective situated knowledge and community-partnered harm reduction strategies to address these risks effectively (Piatkowski & Kill, 2024). Peer advice and lived-living experience emerged as crucial factors in the social protection of risk, highlighting the collective nature of risk assessment and management within communities of people who use IPEDs. In this way, the findings of this study underscore the critical importance of developing collaborative partnerships among people who use IPEDs with scholars, and the health workforce. For instance, healthcare providers currently struggle to engage effectively with this consumer group due to perceptions of stigma and a lack of understanding surrounding the community (Ainsworth et al., 2022; Bates et al., 2021; 2022). To address this issue, collaborative efforts between IPED coaches and educators can emerge as a vital link to community-based harm reduction strategies. IPED coaches, whose expertise is informed by lived-living experience, offer a practical alternative to bridge the gap between medical professionals and people who use IPEDs, where previous concerns of inadequacies have emerged. These partnerships present a valuable opportunity for leveraging strategies which enhance social protections within the IPED-using community.

These approaches draw on the community's ethnopharmacological knowledge of substances, dosages, and

administration—critical in Australia, where the workforce is under-equipped to engage with IPED consumers (Piatkowski et al., 2022; Piatkowski & Kill, 2024). Recognising this expertise, collaborative partnerships offer a unique opportunity, particularly for those without access to IPED coaching, such as through free harm reduction programs at NSPs, a key point of contact with healthcare providers. Strengthening NSPs is a global priority, where in the UK, for example, weaknesses have been exposed (Kimergård & McVeigh, 2014) and perceptions of stigma and association to drugs such as heroin are said to limit the uptake of such services (Cox et al., 2024). Thus, IPED coaches could potentially partner with scholars to expand opportunities for harm reduction training and specialised workshops which have a component directly related to insulin use and management. Furthermore, for women, insulin's non-androgenic properties were particularly appealing, offering performance benefits without masculinising effects (Havnes et al., 2021; Piatkowski et al., 2024f). As IPED use grows among women (Piatkowski et al., 2024e), these findings underscore the need for harm reduction strategies tailored to the specific needs of different IPED-using populations. By combining the expertise of IPED coaches with scholar and clinician knowledge, these partnerships can foster more collaborative, accessible, and informed harm reduction workshops that address the specific needs of all people who use insulin and other IPEDs.

Limitations

This research acknowledges that the sample consisted of 13 male participants and only 1 female participant, which limits the study's ability to capture gender-specific experiences and perspectives. Future research should aim to address these limitations by including a broader range of experience levels among participants and striving for more diverse samples in terms of gender and cultural backgrounds.

Conclusions

The present study explored non-medical insulin use among people who use IPEDs, revealing an interplay between risk production and protection within these communities. By understanding how risk is negotiated and transformed in practice, we use this as a platform to advocate for harm reduction approaches grounded in lived-living experience for IPED consumption, which includes non-medical insulin use. Given the typical gap between people who use IPEDs, IPED educators emerge as a potential collaborative partner in community harm reduction efforts. Lastly, the findings invite further exploration of how community-derived strategies can inform broader public health responses, particularly in contexts of people who use IPEDs and contribute to reducing stigma.

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Ethics statement

Participants provided informed verbal consent prior to conducting the interview. Ethical approval was granted from the Griffith University Human Research Ethics Committee (Approval Number: 2024/308).

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